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The Proposed Additions to Westminster Hall.

DURING the present week the drawings showing the scheme for the treatment of the west side of Westminster Hall, lately laid bare by the demolition of the old Law Courts, to which we referred briefly in our last issue, have been in the Library of the House of Commons for inspection by any members of the Legislature interested in such matters, though we must regret that the drawings have not been systematically arranged on screens in a regular progression, so that they could be easily compared, instead of being merely placed in the room at random. There is a great deal of matter for study in them, but non-professional men will not find it very easy to seize the main points in any case, and still less so when the drawings can only be taken up one by one in the order in which the last comer may have left them. Political men are not very prone to take interest in architecture, and should, at least, have every encouragement.

Mr. Pearson's report, which is printed as a Parliamentary paper, can be obtained by those interested in the matter through any bookseller for the sum of two pence, and a very good two-pennyworth it is. Hence we have not felt called upon to sacrifice other matter, which cannot be bought with copper coin, for the sake of printing over again a report of sixteen foolscap pages, which any one can easily get for himself. We will endeavour, however, to make generally clear what is proposed.

Probably few of the many who traverse Westminster Hall, which is now a great vestibule to the Houses of Parliament, and was for a long time a *salle des pas perdus* to the Law Courts, realise that it was originally the centre apartment or great hall for a palace, built first by William Rufus, but of which it is not clear how much more of the palatial building was realised.* The Hall as now seen is mainly as transformed by Richard II., in whose time the celebrated hammer-beam roof was added (after raising the walls slightly), which is the chief glory of the Hall. It is necessary to bear in mind this original intention of the structure in order rightly to estimate what has been and what is proposed to be done. The "Hall" of a palace or of a mansion is essentially a piece of internal architecture, not intended to present any imposing appearance externally, as it must necessarily be surrounded by other and lesser buildings, forming other portions of the residential architecture. It is improbable, therefore, that Westminster Hall was ever for any long period open to view as it is now, on the west side, any more than on the east. It was probably from an early date the centre of a congeries of lower buildings above which its roof would rise, but which would have hidden its walls for the most part from view. When in use as part of the palace, the north end of the hall would be the serving end, the screen would have been placed there, and probably the kitchens would have been adjacent on the north-west angle of the building. From the earliest date there have been considerable adjacent buildings at this point, and the remains of Early English foundations and masonry abutting on the Hall and extending westward are still to be seen. These Early English buildings extended southwards along two bays of the Norman Hall, the rest of the exterior of which displayed there the usual shallow Norman buttresses which are still to be seen. Possibly at that time the outer wall may have been altogether visible from the west, after getting clear of the Early English buildings referred to. We extract the following summary of the main incidents in the Mediæval history of the Hall from the "Report":—

4. *Henry III.:* 1217, 1221, 1224.—Throughout Henry III.'s reign extensive works were proceeding at the palace. At the same time the choir, transepts, and Lady-chapel of the abbey were being built. Extensive decoration was also in progress.

1244, 1263.—Probable date of the Early English work at the north-west angle of the Hall, of which traces are now visible. See plans No. 1, 4 (d), 5 (a) (b). Fire at the palace.

5. *Edward III.:* 1297 or 1299.—Great fire, which reached as far as the Abbey. This indicates that the fire was on the west side of the palace, and, as a consequence, Parliament had to be held at the house of the Archbishop of York at Westminster.

Edward III. built, adjoining the Hall, a room for "The Hall of the Family in Parliament time," from which we gather that the great hall was used in his reign for the sittings of Parliament, and the fact that Parliament had to adjourn after the fire implies that the great hall suffered. In Edward III.'s reign, at the time of the building of St. Stephen's Chapel, reference is made to new work in connexion with the Hall.

6. Richard II., 1394-97.—It seems from Thomas Walsingham that it was customary for Parliament to sit in the Hall in Richard II.'s reign. Whether to repair the damage which may have been caused by the last fire, or to make the Hall more suitable as a Parliament House, Richard entirely transformed it to its present shape. The walls were raised 2 ft., and re-cased, and new windows were inserted. The existing roof was added; a new northern porch and towers, and the large buttresses lately uncovered were built. Also "divers lodgings" on the west side; these were mostly contained by a wall erected parallel to the Hall, and connecting together the new great buttresses. The two tiers of wall arches between the Norman buttresses were also erected at this period. See plans Nos. 1 and 6.

We had, therefore, at that time a Hall originally Norman, with a fourteenth-century hammer-beam roof on it, massive buttresses and flying buttresses of the same date added for security to the new roof, and between these buttresses a new wall built, parallel to the west wall of the Hall, inclosing the space between the buttresses. It is to the north-west buildings that Mr. Pearsen seems to apply the expression "divers lodgings," though we strongly suspect that if the whole of the inclosed ground were excavated the foundations of other "divers lodgings," of one date or another, would be found between the Hall and the Abbey. Of these Early English buildings at the north-west angle the foundations and portions of the plinth may now be seen, with the new buttresses built over them; while southward of the second bay the plinth of the longitudinal walls ranges with the buttresses, showing that they were built at the same time.

We give Mr. Pearson's synopsis of the remaining stages in the alteration of the buildings:—

7. *Richard III.:* 1484.—Repairs by Richard III. No traces visible.

8. *Henry VIII.:* 1512.—Great fire, which destroyed a large portion of the Palace; never rebuilt, and in consequence of which Henry VIII. removed to Whitehall in 1529.

9. *Elizabeth:* 1570.—Large additions to the west side of the Hall. A large part of the work built at this date remained until 1822. See No. 1.

10. *Charles II.:* 1680.—Additions by Sir C. Wren. See No. 2.

11. *George II.:* 1732.—Courts of Common Pleas and doorway on west side of Hall; also committee-rooms along St. Margaret's-lane; all by William Kent. See No. 1.

12. *George III.:* 1793.—Widening of St. Margaret's-lane, whereby part of Elizabeth's work was demolished. See No. 4 (d) (c).

13. *George IV.:* 1820.—Sir John Soane began work of demolition previously to the erection of his Law Courts.

14. *George IV.:* 1822.—Restoration of north end by Thomas Gayfere, mason to the Abbey of Westminster.

15. *William IV.:* 1834-35.—Re-casing of the walls of Great Hall by Sir Robert Smirke.

* We may observe that *Harper's Magazine* for August contains an interesting popular article on "The Great Hall of William Rufus," which comes rather *apropos* at the present moment.

We have, now that Soane's Law Courts are removed, got back to the Hall, with all its adjacent "divers lodgings" removed; the interior re-cased by Smirke; the north end restored by Gayfere, but the west side left with great portion of Rufus's Norman wall, of Richard II.'s large buttresses, and the foundations of the longitudinal walls between the buttresses, and of some portions of the buildings which formerly projected at a right angle to the Hall at the north-west. What is proposed is to repair and restore the buttresses and rebuild the walls between them, and to place a building also at right angles to the north-west portion of the Hall, on ground which has always been occupied by subsidiary buildings of one kind or another. The alterations also include raising the towers and some altering of the façade at the north end; but this we may regard as a separate matter, unconnected with the treatment of the western face.

The exposed western face, of course, includes a great amount of modern alteration, greatly due to Soane; and the buttresses have been cut into, pared, filled in, and knocked about in all kinds of ways, so that it would not be safe to leave them long in their present unprotected state. But amid all the modern alterations, a great deal of archæological interest remains in the old wall, and it is partly on this account that Mr. Pearson, as we observed in our "Notes" last week, proposes the restoration of the buildings which formerly ran between the buttresses, as the Norman walls will not long survive exposure, and must be either cased or covered. Of what nature was the building which formerly connected the buttresses and covered the lower part of the Norman wall? Part of the evidence on this ground we may give in the words of the report:—

"Richard II. entirely transformed the external and internal aspect of the Hall. Unfortunately the renewal of the work by Sir Robert Smirke was so complete that but few of the old stones exist in the interior. Outside we see the flying buttresses and the massive supports, which were, however, much injured by later additions. Between the Norman buttresses, with the purpose of carrying the floor and roof of the building, which he erected in continuance of the Early English work already referred to, he built arches, of which the upper tier remain, and sufficient of the lower tier to enable me to restore their exact shape. He seems to have done this in order to avoid weakening the wall, which had to carry his massive roof, by inserting corbels or timbers into it. He began his work probably in the two northernmost bays, where he cut out a shallow chace in the existing stonework to insert the arches; but, whether he found that this injured the wall, or from whatever cause, in the other bays the arch is merely set against the Norman work. He built the wall which connected his new buttresses 10 in. thicker up to the height of the floor than above; this also, no doubt, in order to carry the oor, and this I have maintained in my restoration."

Mr. Pearson therefore takes the existing remains as evidence of a two-story building between the buttresses. We can perceive no absolute evidence anywhere of an upper floor,—no trace of it in actual marks of any kind; but the double tier of wall arches and the evidence of the thinning of the upper portion of the wall between the buttresses, referred to in the above quotation, may be accepted as sufficiently probable testimony, as no other consideration will so fully account for these facts. The proposed new design shows a cloister, the arches filled in with iron grilles, on the lower story, and a closed and glazed upper story; a battlemented parapet, the buttresses and flying buttresses carefully restored, and the buttresses finished with large and heavy crocketed pinnacles. For the open cloister there is no evidence, saving a certain inherent probability based on the habits of Mediæval building. For the battlemented parapet there is probability, in the fact that the original parapet of the Hall is known to have been battlemented, and in the height of the returns of the parapet above the roof-line, which latter is marked by the chases for lead; also in a certain print by Hollar; but we have had reasons for thinking that the belief in Hollar's accuracy is a kind of popular fallacy of archæologists, and that he is by no means the authentic witness that he is currently supposed to be. However, the battlements are intrinsically probable, no doubt, and the base of the parapet is distinctly visible on more than one buttress. The pinnacles coincide in general appearance with one which existed on a flying buttress on the east side of the Hall, which Sir C. Barry pulled down, but of which there is an engraving in Brayley and Britton's "Westminster." So much for the longitudinal building between the buttresses. At the northernmost end there is to be a new two-storied building with a high-pitched roof, at right-angles to the Hall, and occupying nearly the position which the Early English building at the north-west angle occupied.

Now, in the first place, as to the uses of these new structures; for architecture, as we all know, is based on utility,—at least, we have all been told so often enough. The lower story of the new north-west building is to be put to a very good use; it is to have an open arcade towards New Palace-yard, and to be used as a shelter for horses and carriages instead of the shed or pent-house at present provided. The lower story or cloister of the other portion is to be an elongated *porte-cochère*, reached by a drive from the corner of New Palace-yard down to the south end of the cloister, turning sharp round into it. Doors will be provided with steps up into Westminster Hall from the cloister. In regard to this part of the work we have to observe that the turn into the cloister is inconveniently sharp for carriages, that the width of the roadway is 14 ft., and the clear height to the main beams of the floor above 12 ft. 6 in.; that the first dimension is a tight fit for large carriages to pass each other, which may at times be necessary, and that the height is equally a tight fit for the largest dimensions of carriage with the most imposing order of coachman. As to the upper stories, no use is suggested for them at all; there is only the general feeling that they are sure to come in useful. They would, however, come in more usefully if it had been settled for what they were to be used, and if they had been planned for that use. The fact is, the Law Courts have been removed before there was any notion what was to be put in their place, and now something must be put, useful or not.

The real use of the cloister building, in fact, according to the statement of the Report, is to preserve the old wall, and to restore what was there before. As to the first point one may ask, are the old walls to be left (the original portions of them) in their present state above and below? If so, they will look very unsightly, and the architect will be doing work in a way which no Mediæval architect would have been content with. We observe, by the way, that there is no indication in the plan of the upper floor as to what is to be done with Kent's odd-looking ogee-headed doorway, across which the new floor will cut. It is indicated below, but seems to have been forgotten above. Secondly, will the open cloister afford much better protection to the lower part of the wall than at present? We should say, not any protection worth the money to be expended (21,000*l.*), if that were the object. Then, architecturally speaking, what is the value of the idea that we are to have restored what was there before? We must entirely decline to admit any value to the proposed addition on that score. If a complete portion, a complete bay for instance, were left to go by, then the rebuilding of the rest to the same design would simply be completing a design which was incomplete. But it is not the case with this restoration. There is not a single existing bit of design for exact imitation. It is all inferential. It is a strong inference that *something of that sort* was there; that is all that can be said. It is absurd to say that we are restoring, even in design, what was there before. And therefore such so-called restoration is archæologically not of the slightest value, and to represent it as such is to "say the thing which is not." *Au reste*, Mr. Pearson's work is in true Gothic spirit, and looks solid and good. But it will not, as we are told it will, add anything to the architectural dignity of the exterior of the Hall. It hardly does so in the perspective drawing; and it will not look even as well as it does there. The level of the cloister will be far below the level of the public roads: it will stand in a hole, and be approached downhill; and it will be further hidden behind the tall and elaborate railing of the precinct, which must be continued on the same design, both for appearance and protection, but which in the drawing is artfully reduced to a low railing that a boy can look over (or climb over). That and the appearance of the levels we regard as a little bit of draughtsman's jugglery, to beguile the unwary spectator. Our conclusion is that a great deal of money is going to be spent on building which, except the shelter towards New Palace Yard, will be of little practical use or convenience; which will only half fulfil its proposed duty of protecting the exposed surface of the old wall; which is *not* a restoration, in the true sense, of what previously existed, and which, in its relation to the whole, has no architectural value commensurate with its cost. Bearing in mind that the Hall is essentially a central hall, that it was never meant to be seen all round, and that it probably was in former times hidden by buildings to the westward of it, a far more truly sensible architectural scheme would be to make use of the vacant ground for building a large range of committee-rooms and other buildings up to the street, which would be of real use, leaving a courtyard between them and the Hall, and then repairing the buttresses and old work of the wall of the Hall in a purely practical manner, rebuilding the buttresses and flying buttresses. The present scheme appears to us to rest on the assumption that the design of the Richard II. period was essential to the architectural completeness of the Hall, and was intended to be seen; whereas, we believe it was mainly utilitarian, as far as the buildings between the buttresses were concerned, and was very probably not seen, except from an enclosed courtyard.

The other portion of the scheme, the addition to and alteration of the north front of the Hall, appears to us to be desirable and an improvement. It is true, as we have seen it already well observed in a daily paper, that a "Hall" of this type has really nothing to do with a western façade and towers; but then on the north side it must always now remain open to New Palace Yard, and therefore can never again have the character of a central hall as far as that aspect is concerned. It has been all re-faced already, and, as the Report says, has "a spurious aspect," as well as looking somewhat mean in connexion with the rich architecture of the new "palace." The raising of the towers will give greater dignity to the whole, and will serve the intended object of connecting the north front better with Barry's adjacent work; and this part of the scheme, therefore, we can sympathise with and recommend.

THE PENISTONE DISASTER.

WHAT are the lessons to be learned from the Penistone accident? The facts do not seem to be capable of much dispute. An ordinary express engine, with a four-wheeled bogie in front and four coupled wheels behind, is descending a gradient of 1 in 124, on a half-mile curve, and with a tolerably heavy train behind it. The speed is high,—something between forty and fifty miles an hour,—but not excessive. One of the cranks of the driving-axle breaks suddenly, right across the outside web. The connecting-rod flies round, digs into the ground, doubles up, and breaks off. The engine and tender are thrown into violent oscillation, lurching heavily, and the engine leaves the rails. The driver puts on his brake,—the ordinary vacuum,—and stops his engine in some 200 yards. The tender and a horse-box following it keep the rails, until the engine has nearly come to a standstill; but the violent lurching is, of course, communicated to the train and is intensified by the centrifugal force on the curve. Such an action would necessarily bring a heavy horizontal bending stress upon the heads of the draw-

bars connecting the carriages to each other. In this case the draw-bar between the horse-box and the first of the carriages yields to this stress, and is broken clean off close to the head-stock. The safety-chains fail to hold the train on the draw-bar breaking; the carriage separates from the horse-box, goes off the curve at a tangent, and takes the rest of the train with it. In a few seconds the whole is piled up in inextricable and hideous confusion at the bottom of an embankment, and a slaughter has taken place comparable to that of many combats recorded in the pages of history.

The first question to be asked is,—How came the crank to break, since this was undoubtedly the primary cause of the accident? This point also is quite clear. All the witnesses speak to the existence of a flaw in the web of the crank on the inside, extending some 2 in. into the metal. The surfaces were not rusty, showing that there was no opening to the outer air, and probably, therefore, no crack on the outside which could have been detected by the eye. The crank had, in fact, been properly examined but a short time before, and there seems no reason to suspect any neglect in the running shed. The axle, which had already run about 50,000 miles, was of "Best Yorkshire" wrought iron, supplied by Messrs. Taylor Bros., of Leeds, than whom no firm enjoy a higher reputation for this class of material. All engineers know that such flaws do occur, though rarely, in the very best wrought iron, and that no ordinary test or examination will necessarily detect their presence. Is the character of the metal itself in fault? Mr. Daniel Adamson, the chairman of the Manchester Ship Canal Company, who has written a lengthy letter to the *Times* on the subject, appears to consider that it is. He says, "The public mind should be disabused of the belief that proper security can be obtained with a very strong metal." We were not aware that the public mind had been abused by the introduction of any such belief, or, in fact, had formed any judgment whatever upon this point. But the criticism is itself a very curious one; for the metal in this case was the best and purest wrought iron, softer and more ductile than the "mild steel" with which Mr. Adamson would insist upon replacing it. Now, it is quite true that railway engineers, even in England, have very much come round of late to the expediency of employing mild steel for railway-axles. They admit that the treacherousness, the liability to hidden cavities, and sudden fracture, which were urged with much justice against ingot metal in former years, are no longer fairly chargeable to the mild steel made for such purposes as axles by our most eminent steel-makers. Still, it will be news to them that the metal is actually so far superior to the much more expensive material known as the best Yorkshire iron, that it should be in all cases substituted for it; and they are hardly likely to take a boiler-maker's dictum to that effect. In fact, the substitution of what is supposed to be a more uniform metal would be a matter of regret, if it were at all supposed to supersede the rigid system of inspection to which every axle is now subjected. What is really needed is some system,—could such be devised,—by which the occurrence of those hidden flaws which the very best metal made by the very best process will sometimes contain, should be rendered patent to the eye of an inspector. Is there any chance of such a system being devised? It is clear that chemical tests, on which Mr. Adamson would rely, are quite useless; they can tell nothing but the general composition of the metal. Electrical tests may possibly yet be used with effect. They were proposed some years ago, and have been revived lately by Professor Hughes, the inventor of the microphone. With his beautiful instrument, the "magnetic balance," he has proved that in wires or small pieces of iron, almost all peculiarities of the metal, including the existence of flaws, can be detected with ease and certainty. His invention has been freely given to the world, but hitherto the world (as usual) has been wholly indifferent to the gift. So far as we are aware no railway or marine engineer has taken any steps with a view to ascertain whether a similar system might not be applied to pieces of large size, such as those required in actual work. Failing this, mechanical tests in a proper testing machine do not seem impossible. If the axle which broke at Penistone, before having been set to work, had been subjected to a sudden cross-breaking strain, similar to that which caused its destruction, but very much below what it should be able to support with safety, we cannot doubt that the resulting deflection or bending would have been far greater than if the axle had been sound. What we would suggest, therefore, is that all crank axles, or other pieces of metal called to fill equally important positions, should be tested by strains similar to those brought upon them in actual work, and that their deflection under those strains should be recorded. A few experiments would be sufficient to show clearly how great this deflection should be in the case of a sound and perfect axle; and if any specimen showed a deflection decidedly higher than the limit, it should be rejected as of doubtful quality. The expense of such a system would not be great when it once became a regular part of the manufacture of an axle; and it appears to us the only method by which a single faulty specimen can be weeded out from a batch of sound and satisfactory articles.

The question of the use of the crank in the locomotive seems to require investigation. It is obvious that occasions of imperfection must occur in the forging of so complex a piece of ironwork as a double cranked axle, which are avoided in the manufacture of plain axles. The Returns of the Board of Trade, if duly examined, will show, or ought to show, whether in point of fact there has been any difference in the proportion of fracture of straight and of cranked axles, confining the inquiry to driving axles alone. The question of inside or outside cylinders, which is determinative of the use or the avoidance of a crank in the axle itself, is one on which much difference of opinion exists among engineers. But it is highly desirable that some authoritative decision should, if possible, be obtained as to the effect on the public safety of using or of dispensing with the cranked axle.

Leaving here the question of the crank, let us go on to consider the parting of the train at the coupling between the horse-box and the carriage. This was, in fact, the second cause of the accident, since, if these couplings had held firm, the whole would probably have been brought to a standstill with no worse evil than a good deal of shaking. Now, in the first place, it seems clear that the draw-hook was broken by a strain to which it is never supposed to be subjected. A draw-hook and draw-bar are made to resist a direct pull, such as is brought upon them in starting or running, and for this they may be amply strong. But there can be no doubt that the strain which broke the draw-bar at Penistone was a strain acting in a direction more or less perpendicular to the length of the train, and due to the violent horizontal lurching of the two vehicles connected by the draw-bar. Probably no engineer, in fixing the dimensions of his draw-gear, has ever taken account of this particular kind of strain; nor, in fact, would it be possible to say how great its amount may be. It is one of those cases which are altogether abnormal and exceptional, and, for that reason, all the more likely to be fatally disregarded. Secondly, it is well to note that a draw-bar having given way, the safety-chains should have come in to vindicate their name, and save the train from parting asunder. As a matter of fact, they failed to do so. Where they broke, and how and why, no witness seems to have thought it worth while to record. We have here a moral pointed for us which has been drawn over and over again,—the moral that safety-chains (which are well-nigh universal on the railways of the world) are in plain words "a snare and a delusion." It must be remembered that these chains are necessarily hung slack, and, therefore, whenever a strain does come upon them (which is, of course, very rarely), it is in the nature of a very violent shock. Such a shock seems almost always in practice to be sufficient either to fracture a link, or to draw the bolt from its fastenings in the head-stock. It will be well if English engineers should be taught by this terrible disaster to take heart, and abolish safety-chains henceforward; throwing the metal thus saved,—or, at least, some part of it,—into the neck and hook of the draw-bar, with a special view of rendering it secure, not only against a direct pull, but also against any cross-breaking strain, such as seems here to have proved so fatal.

Other lessons have been drawn by other parties, and may be taken for what they are worth. Thus Mr. Adamson, whom we have mentioned before, would insist on increasing the depth of our wheel-flanges from $1\frac{1}{4}$ in. to 2 in., forgetful of the enormous expense which such a change would involve. Another correspondent in the daily papers lays all the blame on the fact that the horse-box had presumably four wheels; but as this horse-box kept on the line while the six-wheeled carriages failed to do so, his conclusion scarcely seems to follow from his premisses. More than one of our contemporaries has seized the occasion to proclaim once more the defects of the vacuum brake, and to imply that if the Westinghouse brake were in use on the Manchester, Sheffield, and Lincoln Railway, we should not have this disaster to deplore. We are by no means interested in the vacuum or any other brake, but considering that the draw-gear broke very shortly after the disturbance began, and that the carriages then went immediately over the embankment, we fail to see that any brake could have done much to mitigate the disaster. Other lessons will, no doubt, emerge from the details, when these are fully known and considered; but we are inclined to think that those we have touched upon will be found at least to be among the most important. They may be summed up as follows:—

First. Necessity for some method of testing, not a sample out of every lot of axles, but *every* axle which has to fill an important place, in such a way as will insure its freedom from serious defects. Secondly. The unconditional abolition of safety-chains, and an increase in the section of draw-bars, especially with a view to meeting cross-breaking strains no less than direct pulls.

SURVEY OF WESTERN PALESTINE.

THE literary and graphic record of the survey of Western Palestine is now completed by the publication of two quarto volumes of memoirs, and an atlas of fifty plates. The volumes in question deal, one with the fauna and flora of Palestine, illustrated by beautifully-drawn and coloured plates; and the other with Jerusalem, containing upwards of eighty illustrations. The atlas, or rather portfolio, contains plans, elevations, and sections, showing the results of the excavations at Jerusalem executed from 1867 to 1870 by Captain (now Lieut.-Colonel Sir Charles) Warren, R.E.; and the amount of positive information that is thus brought before the world may be estimated by the fact that the first two sheets enclosed contain a plan showing the actual rock-contours of Jerusalem on a scale of $\frac{1}{2500}$, or 216·6 feet to the inch. Important as are all the records and descriptions of the ancient masonry, which are very clearly given in this series of plates, it is obvious that in the rock-contours we are presented with the very skeleton, so to speak, of ancient Jerusalem. The vast piles of rubbish, amounting in some cases to a depth of upwards of 70 ft., that have resulted from the successive overthrows and destructions of the city, have so far masked the original surface of the ground, that many points have been long and keenly disputed, the key to the right comprehension of which is at once given by the recovery of the ancient levels, which formed the starting-points of the early builders.

A special value attaches to the Jerusalem volume of the memoirs, from the fact that, while stating in the plainest manner the various points as to which such ardent controversy has so long raged, it does so without entering on the arena of dispute. Remarkable pains appear to have been taken to enable the

student to form his own conclusions from the rich mass of evidence now exhaustively brought before the world. The volume commences with a chronological synopsis of the history of Jerusalem, giving the chief events, from the date of the first recorded siege, or capture of the city by David, about B.C. 1044, to the execution of the Ordnance Survey, in 1864. As many as twenty sieges occurred during this period; that resulting in the capture of the city by Saladin, in 1187 A.D., being the twentieth. The last record of the walling of the city refers to the work of Soliman the Magnificent, in A.D. 1542; and the last record of destruction is that of the burning of the Holy Sepulchre Church in 1808.

The first chapter of the memoirs deals with the architectural history of Jerusalem, commencing with the remarkable scarps in the present British cemetery, which are thought to be a portion of the very earliest defences of the citadel. This chapter is exhaustive of the bibliography of this part of the subject; and is illustrated by a plate containing five plans of the Church of the Holy Sepulchre, referred to as,—1, Constantine, A.D. 335; 2, Modestus, A.D. 616; 3, Arculphus, A.D. 680; 4, Nicephorus, A.D. 1048; and 5, Baldwin, A.D. 1103.

The second chapter gives the history of Jerusalem exploration, citing the records that exist from the earliest Christian account of the city, given by the Bordeaux pilgrim in A.D. 333, down to the clearing out of the Muristan by the German Government (1872-74), and the exploration of the Zion scarp by Mr. Henry Maudslay, in 1874. This chapter is followed by a statement of the principal controversies, indicating the points relied on by the advocates of the different views. The ground is thus cleared for the historic description of "Explorations in Jerusalem," seven distinct chapters on which occupy the remainder of Part I.

Part II., on "The Environs of Jerusalem," commences with a key-map on the scale of 2 in. to a mile, showing the Arabic nomenclature, and new buildings, ninety-six indications being referred to in an accompanying table. This chapter opens by an account, illustrated by a tracing of a squeeze, of the very ancient Hebrew inscription discovered in a rock-cut tunnel in 1880. A short chapter gives copies or facsimile reproductions of the various ancient inscriptions as yet collected at Jerusalem; and Part II. concludes with a chapter on the Holy Sepulchre.

It is in this chapter, which has to be read together with that on the "Holy Sepulchre and Calvary" in Part I. (p. 112), that many persons will find the most intensely interesting result of the entire labours of the officers who have surveyed the Holy Land. With one important class of readers, to whom the weight of ecclesiastical tradition is conclusive, there is, of course, no question open. It is accepted by them almost as a matter of faith that the sites of the crucifixion and of the entombment were known to Constantine, and protected by that emperor by the church of which the successor yet stands. To those persons who do not take this view, two questions arise,—one is as to the site of the Church of Constantine, and the other is as to the reliability of the assertion that that church stood on the very site of the events which its erection commemorated. As to the first, no one but Mr. Fergusson, we are told, doubts that the basilica of Constantine stood on the site of the present Church of the Holy Sepulchre. Mr. Fergusson's view is founded on architectural considerations alone, and these are controverted by the Duc de Vogüè. It involves, among other difficulties, the rejection of all the statements of early writers on the subject, the assertion that the magnificent Kufic inscription round the Dome of the Rock is a forgery, and the theory of a change as to traditional identification of the spot somewhere about the eleventh century.

The question as to the accuracy of the indications given to, or by, Constantine, will to many people seem more perplexed than that of the real locality of the basilica reared by him. The writers on both sides are cited in the volume before us. But to those who regard Jerusalem as a military position, as well as to those also who are aware of the extreme rigidity of the Jewish law as regards places defiled by the death of a Jew, the rock-contour levels above referred to conclusively show that the site of the Holy Sepulchre Church is within the ancient, as well as the modern, city, and could not, therefore, have been the locality either of a place of execution or of a tomb. The traditional site of the place of execution by lapidation has now been recovered. It is on a knoll without the city, at a height of 2,550 ft. above the sea, or 110 ft. above the Sakrah rock in the Haram enclosure, and is surrounded by a sort of natural amphitheatre from which the entire population of the city could witness what took place. In 1881 a smaller knoll at about 200 yards distant from the former was found to contain a Jewish tomb,—of which a plan is given in the account, first published in 1881, which gives Captain Conder's reasons for suggesting that this may be the veritable site of the tomb of Joseph of Arimathea. All other proposed identifications shrink to nothing in their interest compared with that of the true Holy Sepulchre.

Plates 48 and 49 reproduce reconnaissances of the plain of Philistia, and of the Jordan valley, by Lieut. Warren, in 1867. Although superseded by more detailed work since, these sketches of the country have great historic interest, and show how, step by step, the Palestine Exploration Fund pushed forward to obtain that complete knowledge of Syria which is now before the world. Exploration east of the Jordan, as is but too well known, has been arrested by political events, but enough has been done in Moab to render clear certain points which had perplexed the officers of the survey in the Holy Land, such as the occurrence of certain hollows cut in the rocks at conspicuous stations. Such hollows have been found also east of Jordan, always associated with cromlechs, dolmens, or other megalithic remains; and the absence of the latter, but presence of the former, in cis-Jordanic Palestine, is held to point to the cleansing of the Holy Land from the structures associated with the pagan worship that prevailed before the Exodus.

Colonel Warren's plans are clear and exhaustive, and bring at once before the eye the result of an incredible amount of patient toil. The sections, as well as the plans, are drawn with that accurate skill for which the Royal Engineers are deservedly famous, and the drawings of the prodigious masonry yet standing in part of the wall of the noble sanctuary, or Temple enclosure, are beautifully finished, and faithful.

An appendix contains an account of the plain of Philistia, illustration of plate xlviii., by Colonel Warren, which was published in the quarterly statements of 1871; and one of the expedition to the east of Jordan, in July and August, 1867, illustrative of plate xlix. There is also a short notice of the pottery and glass found in the excavations, several plates of drawings of which are in the portfolio. The accuracy of the work, the fidelity of the records and sketches, the exhaustive examination of the country, and the faithful attribution to each member of the successive exploration parties, of his own work, combine with the excellence of the work of the printer and of the engraver, to make this volume a worthy monument of an exploration that does honour to our country and our era.

The excellent volume on the fauna and flora of Palestine is unhappily deficient in having neither table of contents, index, nor list of illustrations. The latter include beautiful coloured plates of the *Hyrax Syriacus* (the coney of the authorised version); the Syrian Bedin or ibex (the wild goat of the authorised version); six species of Acomys, or field mouse, and kindred species; the mole rat (*Spalax typhlus*); and the quaint little jerboa (*Dipus Hirtipes*), among mammalia.

The birds are illustrated by the white-throated robin (*Erithacus gutturalis*); the lovely Palestine sun bird (*Cinnyris oseæ*), cock, hen, nest, and young; Tristram's serin (*Serinus canonicus*), and the Moabite sparrow (*Passer moabiticus*); the Desert rock sparrow (*Petronia brachydactyla*), a rare bird; the orange-winged blackbird, or Tristram's grakle, a species peculiar, as far as is known, to the immediate neighbourhood of the Dead Sea; a night-jar of peculiar colouring (the *Caprimulgus tamaricis*); and a curious and admirably-drawn species of darter (the *Plotus Levaillantii*), which haunts and fishes in the Lake of Antioch. Three plates of reptiles and four of fishes, uncoloured, complete the illustrations of the volume, which is from the pen of Canon H. B. Tristram.

NOTES.

THE Committee appointed to consider the laying-out of Hyde Park Corner have stated that they are now in a position to invite subscriptions for three specified objects:—1. The laying-out of the *place* architecturally with suitable decorations, including candelabra. 2. The completion of the arch in the manner originally designed by Decimus Burton, with bas-reliefs round the "pediment" (query—podium"?), and the erection thereon of a quadriga in bronze carrying a figure of Victory. 3. The provision of a suitable pedestal for the existing statue, and its erection thereupon at Aldershott. As to the latter item, we have already said that we consider it the best proposition that has been made for dealing with the colossal statue. As to the second proposition, having for years repeatedly urged that Burton's design should be completed according to his original intention, we are glad that this should be carried out, although we may observe that the suitability of such a termination to the arch is greatly lessened now that it is removed from its position as part of a monumental approach to London, and reduced to a mere park entrance, connected with nothing, and grouped with nothing else on the site. As to the first point, the laying out of the site, it seems to us perfectly unreasonable for the Committee to expect any subscriptions until they publish a plan showing what they mean to do, and no plan can possibly be satisfactory which does not commence by starting afresh, and obliterating all the lines of the present so-called "laying out" of the *place*, which is simply an estate agent's plan of the most commonplace description.

THE question put to the Chairman of the Metropolitan Board of Works by Mr. Gray, in the House of Commons, on Monday last, refers to what appears to be a serious defect in the law affecting the construction of large buildings in the metropolis. A large hotel is in course of erection in Northumberland-avenue, with a lofty curb roof containing two stories, and in parts three stories of rooms, these rooms being enclosed with wood covered externally with slates. Sir J. McGarel-Hogg, in reply to the question, informed Mr. Gray that the building was constructed in accordance with the Metropolitan Building Act, and that if any alteration in the law was required it could only be effected by special legislation. In America the disastrous fire in the city of Chicago called the attention of the authorities to the danger from fire resulting from the construction of several stories in roofs composed almost entirely of inflammable materials, and the employment of Mansard roofs was forbidden unless wholly constructed of fire-resisting materials. The use of this form of roof has been hitherto restricted in this country, but there appears to be a growing disposition to adopt it in the case of large buildings, and it is well that attention should be called to the ease with which fire may be communicated from one building to another by this means.

THE "Sanitary and Insanitary Houses" at the Health Exhibition will be open to the public next week, and on the method on which they have been arranged, will probably prove the most really instructive item in the whole exhibition, if visitors take advantage of the opportunities of instruction afforded them. The houses are arranged so that visitors enter

at the ground floor of the Insanitary House, and, after passing through its various attractions up to the top floor, they cross over to the Sanitary House, and descend through it. Every item in each house will have a label attached to it, and a small handbook is in preparation bearing the corresponding labels as marginal headings, accompanied by a short paragraph, giving, in plain language, the reasons why each arrangement is good or bad. The sub-committee for getting up the houses, consisting of Captain Galton, Professor Rogers Field, Professor Corfield, Mr. H. H. Collins, and Mr. Ernest Turner, have had an uphill fight to get the site and the money for erecting the houses; and great credit is due to them for the result, and for the manner in which it has been worked out.

THE current number of the *Quarterly Review* contains a readable article on Mr. Fergusson's "Parthenon" and "Temple of Diana," generally supporting his views, especially in regard to his very ingenious explanation as to the number of columns in the Temple of Diana, and the means of providing for the number specified by Pliny, to which we referred in reviewing Mr. Fergusson's work a little while since. The Reviewer calls this suggestion of the nine-columned back elevation of the temple, as supplying the uneven number (127) in the text of Pliny, "a stroke of real genius," and the expression is just. The article suggests nothing new in archæological criticism. The writer has made a very absurd slip in representing Bacon as saying that some ancient monuments were to be "chewed and digested." Bacon never used a simile which, in relation to a temple, would seem so absurdly far-fetched. He used it of the contents of books, "some of which were to be tasted, some swallowed," &c.

ACCORDING to Mr. Bailey Denton, the minimum flow of water at Teddington is 450 million gallons daily; but it is doubtful if even that quantity has been available during the last two months. Mr. Phillips Bevan, whose pamphlet was reviewed lately in the *Builder*, states the average daily supply taken in January last for the supply of the metropolis by the several companies from the Thames to be nearly seventy-one million gallons; so that Mr. Labouchere's estimate of one-seventh is below the mark; while that assumed by Mr. Thrupp,—viz., two-thirds,—is altogether beyond it. That there should be some central authority for controlling the river Thames we are quite prepared to admit; but that a dictatorship should be accorded to Sir C. Dilke for that purpose, as suggested by Mr. Labouchere, is not quite apparent. As we have already more than once advocated, the real remedy for dealing with the water question for this country is the constitution of a Government Central Authority, to whom the regulation of the entire water interests of the kingdom should be entrusted, and to whom all questions of supply, drainage, floods, or transit should be submitted. The piecemeal legislation which has hitherto characterised our proceedings in those questions has been at the root of all our difficulties, and until this has been remedied by taking up the subject of water regulation as a whole, there seems but little prospect of their being satisfactorily solved.

THE indifference of the Government to the appearance of our public buildings is already sufficiently illustrated by the additions to the National Gallery and the Old General Post-office, where the sky-line has been destroyed by mean and incongruous excrescences; but if an additional proof were wanting of the disregard of art by public bodies, it is furnished by the recent erection of an iron shed on the inclosed space in front of the east wing of the National Gallery. The so-called "finest site in Europe" has been disfigured from time to time, first by a preposterous monumental column placed in its midst, then by the addition of commonplace statues on pedestals of different heights and sizes, then by the erection of a gigantic hotel overshadowing and dwarfing everything; but the crowning abomination is the erection of this iron shed. The trustees of the National Gallery are men of culture; they are not unmindful of the appearance of the interior of the building in which the national pictures are kept; but they exhibit very little concern for the symmetry of its exterior.

THE Treasury have agreed to give the sum of 5,000*l.* towards the purchase of a site in Edinburgh for the New Museum of Antiquities and National Portrait Gallery of Scotland. The design for the new building (the cost of which, amounting to 20,000*l.*, was, as formerly stated by us, contributed by an anonymous donor), has been entrusted to Dr. Rowand Anderson. The loan exhibition of national portraits, in the rooms of the Royal Scottish Academy, continues to excite public interest. The works of Raeburn gain in public estimation both on account of their technical excellence and the truthfulness and force with which the characters of the sitters are brought out. Sir John Watson Gordon is equally happy in the latter respect, but is far behind his predecessor as regards dexterity of handling and brilliancy of colour.

THE fifth Congress of Italian Engineers and Architects will be held at Turin, from the 22nd to the 29th of September next. Foreign architects or engineers will be admitted on making application conformably to certain regulations, which may be obtained from the Secretary of the Societa d'Ingegneri, &c., at Turin. Free entry into the rooms of the latter society will be accorded, during the period of the Congress, to any architect who brings a letter of recommendation signed by the President of the Architects' Society to which he belongs. Although Turin is not one of the special seats of early Italian architecture, there will be doubtless much to learn during the Congress, by any English architect who may find his way thither at the end of September, by which time we may hope that all fear of cholera will have disappeared.

ACCORDING to a well-informed correspondent, the show of sculpture in competition for the Wallace Memorial at Aberdeen, the designs for which were exhibited last week, was of a very inferior description, confirming what seems to be pretty nearly an accepted fact, that sculptors of eminence decline entering into such open competitions, where they have little chance of gaining either honour or more solid recompense. A limited competition to a certain number of eminent artists, by invitation, and with a fee to each competitor, would possibly have produced a very different result.

A DEPUTATION from the Society for the Protection of Ancient Buildings inspected, on Monday last, by permission of H.M.'s First Commissioner of Works, the drawings prepared by Mr. J. L. Pearson for the restoration of the west side of Westminster Hall, which are deposited in the library of the House of Commons, and afterwards made a minute examination of the buttresses and the exposed portions of the west wall of the building, accompanied by Mr. Taylor, of the Office of Works. The Society have it in contemplation to prepare a memorial to the Government with regard to the proposed additions to the hall and the treatment of the western wall, the greater portion of which is the work of Rufus, the original surface and the mason's marks remaining intact. If we read aright Mr. Pearson's report, however, the preservation of the original state of the wall is precisely one of his objects.

EVEN in these days of general dispersion of heirlooms it is not often that a genuine Mediæval castle finds its way into the market. But at the present time there are two properties of, at any rate, feudal importance offered to public competition. One of these includes the extensive ruins of Middleham Castle,—a fortress peculiarly rich in historic memories. The Norman keep, built by Robert Fitz Ranulph soon after the Conquest, is almost the only part of the original structure that has survived, and is a grand specimen of massive masonry. Its dignity, however, is somewhat impaired by the great height of the buildings by which it is enclosed, and which were erected,—chiefly in the fifteenth century,—to suit the sumptuous tastes and larger requirements of the Nevilles. The castle was often the residence of royalty. Richard Neville, Earl of Warwick,—the great "king-maker,"—entertained within its walls the ill-fated Edward IV., whose brother, the Duke of Gloucester, afterwards Richard III., made it his frequent abode. It will be remembered that he married Warwick's daughter and heiress, and it is said that their only son, Prince Edward, drew his first and last breath in Middleham Castle. After this period the building seems to have fallen into decay, and its ruin was completed in 1646 by the Parliamentarian troops who did their work of destruction with characteristic thoroughness. To make the castle again fit for residential purposes is, of course, now out of the question, but there is much to be said in favour of its being acquired by the nation and placed under suitable custody. Independent of its claims to preservation, as the sometime residence of the last of the royal Plantagenets, it has an interest as having been the home of "the Last of the Barons," and, therefore, in a double sense, classic ground.

THE other property, better known to artists than to historians, is Boscastle (*i.e.* Botreaux Castle), on the north coast of Cornwall. The ruins are in themselves insignificant, and the memory of their founder is almost extinct, but the name still preserves some faint reminiscence of the baronial family of Botreaux, which was settled in Cornwall as early as the reign of Henry II., and sent one of its members as a Baron to the Parliaments of Edward III. The site is wonderfully beautiful and romantic, not far from Tintagel and other spots familiar to lovers of the picturesque and students of Arthurian lore. It may be added that Goodrich Court, which the late Mr. Blore erected for Sir Samuel Meyrick, is also offered for sale. The architect was very fairly successful in his effort to reproduce an externally faithful copy of the castellated architecture of the Edwardian era. The internal arrangements are, of course, far from being Mediæval, and the famous collection of armoury is no longer a part of the treasures of the Court. Contiguous to it, but not within the limits of the estate, are the beautiful ruins of Goodrich Castle, which every tourist has seen.

THE CHÂTEAU OF CHANTILLY.—I.

THE complete reconstruction of the Castle of Chantilly marks a date in its history, and adds to the interest felt in it by those whose imaginations have been kindled by a visit to this famous residence of the Constable Anne de Montmorency and of the great Condé. Each of these two great commanders, at an interval of two centuries apart, took up his residence at Chantilly, and employed his leisure in improving and beautifying it. Natural conditions of the soil have given to the Castle of Chantilly a character surviving all changes of style, taste, and fashion, and have influenced even those modifications imposed by the habits and necessities of modern life. The same conditions having also necessarily dictated the architectural course which has been adopted, it will be indispensable to our present purpose to examine them, as a means of tracing the reason and origin of much that has been done.

About twenty-five miles north of Paris, and two miles and a half from Senlis, in what was formerly the Isle de France, and is now the Department of the Oise, Chantilly rises from a varied, gently undulating, park-like country, on the borders of extensive forests. A rapid stream, La Nonette, formerly flowed through the marshy tract in the midst of which there rose abruptly an irregular mass of limestone rock, doubly protected by its height and by the stream surrounding it. These favourable conditions caused the spot to be chosen as the seat of a habitation as far back as the tenth century. Without carrying our researches to so early a period, and confining ourselves to feudal times, we find proof in various charters that in 1263 the fortified castle on the rock was a dependence of the

family of the Bouthilliers, who held office under the Counts de Senlis, their feudal lords.

Through William IV. de Bouthilliers, the castle descended to Jean de Clermont, Chancellor of France, who was killed at the battle of Poitiers; and by his will it passed to Guy de Laval (1356). From Guy de Laval it came to Pierre d'Orgemont, Chancellor of France and President of the Parliament; it was in his time that the Burgundians took possession of Senlis (1422), and when the English forced their way to the Isle de France (1425) Chantilly resisted and fell, being included in the list of fortified castles which were to be occupied by an English garrison. In 1429, when Charles VIII. reconquered Compiègne, Chantilly was restored to the d'Orgemonts.

Four years after these rude vicissitudes, Pierre d'Orgemont, third of the name, dying without issue, bequeathed the estate to Jean II. de Montmorency, grand chamberlain of France; and this is the origin of the possession of the fief by the Montmorency family (1429). Jean II. was succeeded by his son Guillaume, and Guillaume by Anne, who was born at Chantilly in 1493, and who was destined to become in course of time Grand Constable of France, the builder of the Chantilly of the Renaissance.

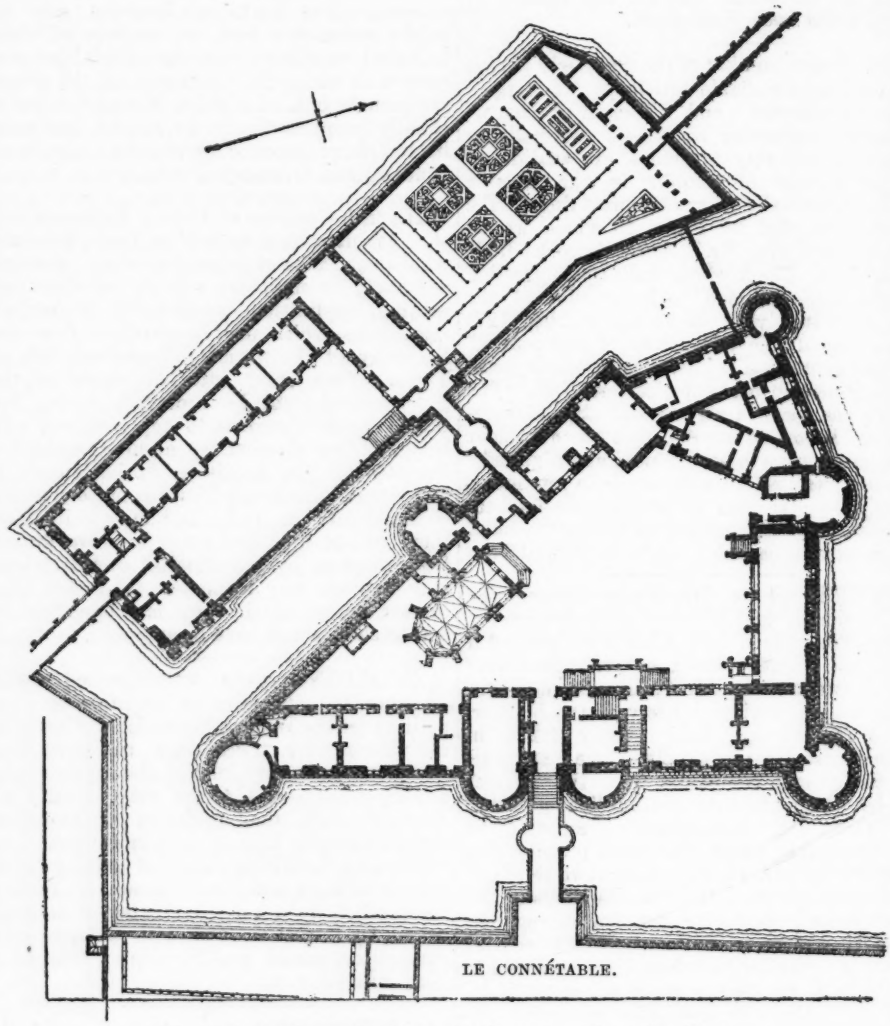
It was the end of the period of the Middle Ages,—that troublous time when part of the soil of France was still occupied by the invader,—and before the grandson of Jean II. had come to man's estate, France was in the full current of the Renaissance, Ravenna, Pavia, and Marignan had been fought, and Charles VIII., Louis XII., and Francis I. had made those famous expeditions into Italy which were to exercise so important an influence on the progress of French art.

There is every reason to believe that from the d'Orgemonts to the Montmorencys Chantilly retained its original aspect. It was in 1538, at a time when he was estranged from the Court, that Anne de Montmorency conceived the preject of rebuilding the castle. The invention of artillery had rendered the means of defence proper to the Middle Ages practically useless; the greater or less elevation of a position no longer influenced its safety, nor was the depth of its trenches of the same consequence as heretofore. Notwithstanding the religious and civil wars which desolated France up to the close of the sixteenth century, the age had become more secure; the feudal system was overthrown, and the attitude of the nobles was no longer that of defence against a more powerful neighbour; the spirit of individualism and of adventure was, in fact, extinct. Architecture, the faithful mirror of the manners of the age, reflected alike in the planning and in the construction of buildings the changes which had come over the social conditions of the country.

This is not the place for sketching the rough, soldier-like features of the Constable Anne de Montmorency. Inflexible alike to himself and to others, incorruptibly faithful to his country and his sovereign, Anne is the last man of the Middle Ages, the first "Grand Seigneur" of the Renaissance; the transition between the two periods is faithfully represented by the union in his character of brutality, violence, and egotism with high aims and strong feelings of duty and personal dignity. Rising to the highest political and military honours of the state, and possessed of an immense fortune, he resolved to transform the fortress in which his youth had been passed, and whose bare, stern walls were still pierced with the blows of the Burgundians and the English, into a castle worthy of his wealth and grandeur, bearing the impress of that taste for the fine arts which he had acquired during his campaigns in Italy.

In the time of the Bouthilliers, of the Clermonts, and of the Orgemonts, Chantilly Castle rose from a triangular-shaped rock, surrounded on all sides by the river, whose course was accurately followed by the lines of the buildings. These were built round an interior courtyard, and abutted at the three corners against huge towers of defence. Beneath the ground-floor, which was on a level with the flattened summit of the rock, vast subterranean chambers were hollowed out, forming a complicated network of passages, hiding-places, covered communications, and rooms for domestic purposes, and for the use of the Corps de Garde. This part of the castle was lighted from the trenches, which were steep, and it formed a solid and majestic base for the massive erection above. The limestone rock upon which the castle was built communicated with the plain below by a natural incline of very gradual ascent, which gave easy access to the east front. On the north side the slope ceased abruptly, and was replaced by huge steps cut in the steep rock. Whether natural or artificial, this terrace still exists, and is known as "Le Connétable." It gives access now, as formerly, to the principal front of the castle, which was isolated by means of a wide moat, and connected, both in the building of the Middle Ages and in that of the Renaissance, by a drawbridge between two towers, whose massive buttresses can still be traced.

Androuet Ducercean, in his celebrated work published in 1579, "Les plus excellents Bastiments de France," has preserved the plans and elevations of the building with which the Constable Anne de Montmorency replaced that of the Middle Ages. He summoned the aid of a young man named Jean Bullant, who had lately returned from studying the monuments of antiquity in Italy, and was already reckoned among the distinguished architects of the day. Jean Bullant was associated with Philibert Delorme in the building of the Tuileries, and he it was to whom Catherine de Medicis entrusted the erection of her famous "Hôtel de Soissons" in Paris, of which one tower, intended for astronomical observations is still standing close by the "Halle aux blés." He added to his fame by two great works undertaken for the Constable, at Chantilly and at Ecouen.



Plan: Chantilly in the Sixteenth Century.—From Du Cerceau.

Obliged by the nature of the ground to retain the triangular enclosure, and desirous of profiting by the labours of the engineers of the Middle Ages who had excavated the subterranean buildings, Jean Bullant contented himself with introducing the richer style of the architecture of the Renaissance into the façades opening upon the interior courtyard, and kept the massive towers of the exterior, which gave the castle its character as a fortified building. The Constable had a large family, a numerous retinue, a military establishment, and body of troops, for whom accommodation had to be provided; the architect, therefore, came beyond the walls, threw a bridge over the moat, and selected a site on the south-west (at a much lower level than the castle, of course) upon which to erect an annexe. This is the "Châtelet," the upper story of which corresponds with the ground floor of the old castle. The subterranean buildings were brought into the plan, and being enlarged by continuing the excavations in the rock, were made use of for all the household, civil and military offices. We may date from this time the truly exceptional importance of these vast subterranean chambers, so spacious and comfortable, as to remind the visitor of the similar structures at the Palais de Justice.

The plans preserved in Du Cerceau's work give us the Chantilly of the Renaissance as it was, and relieve us from the necessity of studying the edifice of Jean Bullant in detail.

One point, however, we must take note of, viz., the means of communication between the subterranean chambers and the terrace called "Le Connétable."

An agreement with the builders, bearing date 1538, proves that Jean Bullant, by equalising the steps of the terrace, underpinning the retaining walls upon the trenches, decorating them with gurgoyles to carry off the rain, and probably also by re-arranging the subterranean passages and chambers, gave to that part of the building the massive aspect it has ever since retained; it was he who christened it "Le Connétable."

Anne de Montmorency, dying in 1567, left his castle to his children, and it was in possession of his grandson, Henri II., Governor of Languedoc, Maréchal de Montmorency, when he was made prisoner at Toulouse in rebellion against the king; he was beheaded in 1632. This Montmorency married an Orsini, who, having been educated in Italy, had brought with her the architectural ideas of her country. It was she who directed the construction of the grand staircase on the north side of the castle, leading to "Le Connétable," and thence to the gardens and the ornamental water. The great allegorical groups of statuary peopling the niches, the huge vases, the heavy columns adorning this majestic staircase, remind us of the Florentine artist Ammanati, and of the gardens of the Pitti Palace, and other Italian villas. The staircase itself served as a colossal pedestal for the equestrian statue of the Con-

stable, which was overthrown during the Revolution. The rebellion and execution of the Maréchal de Montmorency led to the confiscation of his property; but Louis XIII. restored Chantilly to Charlotte de Montmorency, sister of the Maréchal, and she brought it as her dowry to her husband, Henri de Bourbon, Prince of Condé, father to the conqueror of Rocroy.

The great Condé (1621—1682) wrought a complete transformation in the architectural aspect of Chantilly, and this he accomplished under much the same political circumstances as those which had influenced his famous ancestor, the Constable Anne. He, like the Constable, was at the time living in retirement on his estate, suspected by the Court, and holding aloof from public affairs. At the commencement of the seventeenth century Chantilly still represented the refined age of the Renaissance, with a reminiscence of the Middle Ages; the great Condé succeeded in making it a striking example of the new architectural period that has received the name of the reign which witnessed its birth in France, and the grandeur, the magnificence, and the theatrical ostentation of which it so faithfully reflects. We must not neglect to note one circumstance of some importance in the history of French architecture. Chantilly Castle and gardens are of earlier date than Versailles, and, great as may be the disproportion between the two, it is, nevertheless, certain that it was after his famous visit to the conqueror of Rocroy at Chantilly that Louis XIV. determined upon employing Lenôtre to lay out the gardens of Versailles.

Condé rebuilt the whole castle with the exception of the Châtelet, the exterior of which was left untouched, while the interior was decorated according to the taste of the age. It was no more possible for Lenôtre than for Jean Bullant to ignore the conditions imposed upon him by the nature of the ground and the successive works of his predecessors in the solid rock. The triangular inclosure remained; even the corner towers were left standing, contrary as this was to the prevailing taste; those which broke the principal façade, right and left of the only entrance by the "Connétable" were razed to the height of the drawbridge, which was done away with and replaced by a front, resembling in its main features the porch of the Invalides.

Magnificent as were the proportions of the new building, its lines were of an extreme simplicity; the central design was crowned by a high-pitched roof with trophies at the two corners; the façade to the right and left consisting of a ground floor, an upper story, and a "Mansard" story, in the style of that at the Invalides, was pierced by windows (without architraves), with a balcony extending the whole length of the front. The building abutted at its northern and southern extremities upon the two corner towers, which were surmounted by observatories.

The plan of the Louis XIV. building was extensive and of magnificent proportions. Air was admitted to the subterranean chambers, the passages were widened, the military offices swept away, to make room for that exclusive attention to the "service of the table" which was required in order to provide, at any given moment, for those sumptuous banquets described by Madame de Sévigné which the tragic death of the "great" Vatel has rendered famous in history.

The principal staircase to the upper stories, placed in the southern angle of the court, was of enormous proportions; so also were the rooms, which all, from the antechambers to the galleries and the cabinets, bore the name of the king.

As we have already said, the Châtelet alone preserved its architectural character, the great Condé making it his personal habitation. The vast hall which looked upon the "Pēlouse" (the race-course) was magnificently decorated in the taste of the time, and entered from the famous "Salon des Singes," a unique example of a witty idea rendered by a skilful pencil. The Prince caused the warlike achievements of his father to be depicted on the walls of the great hall, leaving space for his successor to add the representation of the battles which had been won by his own valour.

Our space, too limited for its proper purpose, will not allow us to describe the gardens laid out by Lenôtre; it is only possible to do justice to their magnificence by examining the series of engravings of the seventeenth century, which illustrates the royal visits to Chantilly. Anne de Montmorency had the genius of construction; the Condés, by tradition, loved gardens and the chase; nor can it be denied that they loved show also, and sometimes mistook size for grandeur. This was notably the case with Louis Jules Henri de Bourbon, who, between 1719-1735, built the famous Chantilly stables of such unreasonable size that they ran the risk of spoiling the effect of the main building, had it not fortunately been preserved from so great a disaster by the distance of the stables, and the diminishing effect of the perspective. This pompous Bourbon had acquired enormous wealth by the timely sale of his shares in Law's famous bank, which had taken up its quarters in his own hotel in the Rue d'Avoye, "L'Hôtel de Montmorency," called for the nonce "L'Hôtel de la Banque du Mississipi." The Château d'Enghien, built in 1772 in the space of four months, on the occasion of the birth of a Duc d'Enghien, lies to the east of the great castle towards which it turns its regular and finely-proportioned front.

At the time of the French Revolution Chantilly Castle, notwithstanding some alterations in detail, presented the same general appearance as in the time of the great Condé. An engraving of the 9th of August, 1789, representing the Revolutionary troops coming to take the cannons from Chantilly to arm the population of Paris, shows the castle as it existed on the eve of the great overthrow which was to leave no stone of it standing upon another.

The Reign of Terror came. The Condés emigrated; the Chantilly estate was sequestrated, together with the majority of princely residences in France; the collections were dispersed, the statues destroyed; that of the Constable, represented as a hero of antiquity, his naked sword in his hand, which was placed on the "Connétable," was broken up; so were those of Henry IV., of Louis XII., and of the great Condé himself, the work of the sculptor Coysevox. The Museum of Artillery, which was said to contain a precious relic, the armour of Jeanne d'Arc, was dispersed; its principal contents, recovered at a later date, now form part of the Museum of the Invalides. The castle was converted into a prison under the Terror, and 1,100 prisoners were incarcerated there; then the "black band" took possession of it, and dismantled it; finally, it was destroyed stone by stone, and the Châtelet was on the point of disappearing in its turn, when it was discovered that the possessors had not observed the terms of the bargain made with the State. The Ministry of War thereupon claimed the building for the use of the army, and a troop of cavalry was installed there; thus the great stables, the Château d'Enghien, and the Châtelet were saved.

Then came the Restoration (1815). Prince Joseph de Bourbon returned to France, and revisited Chantilly. The great castle was razed to the ground, and the cleared space levelled and enclosed by railings. In 1820 the last of the Condés, grand master of the hounds, who was fond of Chantilly, restored the Châtelet. It was then that a change was made of considerable importance in the history of building. From 1538 to 1820 the Châtelet was cut off from the upper castle by wide trenches and a drawbridge. These trenches were now filled up, and the two islands, upper and lower, were made into one. Other works were carried out of little interest from an architectural point of view, and the prince, who had hitherto resided at St. Leu Taverny, had determined to take up his abode at Chantilly when his sudden death put an end to his intention. By a will, dated August 30th, 1829, the last of the Condés appointed as sole legatee his great-nephew and godson Henri Eugène Philippe Louis d'Orléans, Duc d'Aumale. The same will directed that the castle of Écouen, Jean Bullant's *chef-d'œuvre* (also built by the Constable Anne de Montmorency) should be converted into a charitable institution. As such it is now in the hands of the administrative council of the order of the Legion of Honour. The final reconstruction of the castle of Chantilly was the work of the Duc d'Aumale.*

The Alexandra Palace.—It is stated that the London Financial Association, as owners of the Palace and grounds, have let the Palace and the south portion of the park (exclusive of the racecourse) for exhibition purposes.

* To be continued.

THE INTERNATIONAL FORESTRY EXHIBITION, EDINBURGH.

THIRD NOTICE.

AFTER passing the South African exhibits we come upon the Indian collection, which occupies the remaining bays of the central avenue to the right until the central transept is reached, of which it also occupies the whole south wing. It has been admirably arranged under the directions of Colonel Michael, C.S.I., who is considered the founder of practical forestry in India. The collection is the largest exhibited, and contains some splendid specimens of wood, every article being specially labelled, a practice which might have been generally followed with advantage. The "Index Collection," which has been sent from Calcutta, comprises about 800 specimens of trees from the various portions of India which have been alphabetically arranged and the geographical locality marked on each. From Bombay there is sent a fine collection of woods, which are cut so as to show the grainings and texture of the timber, both in its rough state and when varnished. There are important contributions from British Burmah, and amongst these are beautiful specimens of teak contributed by the Bombay Burmah Trading Company. In preparing teak (*Tectona grandis*) for export the logs are sawn into squares. A market has to be found for such scantlings as can be cut from the slabs. The larger scantlings thus obtained are easily disposed of, and a fair price is obtained, although considerably below what the cost would be if cut of equal quality from the squares which form the bulk of the shipments. For any small sizes, however, say 6 × 1, the supply is considerably in excess of the demand, and such material can always be had in the principal markets of India at less than half the cost that would produce them cut from the square.

The logs shown are as imported to the European markets, but especially dressed and polished for exhibition. One is remarkable for its extreme length, the difficulty of bringing such very long logs from the forests being very great. Teak planks are principally taken off the sides of the logs during the process of conversion from the rough state into merchantable squares, and are much cheaper than if taken from the squares, while the quality is, if anything, superior, as the best wood is that nearest the outside. Teak is exclusively used for making wheel blocks, for the filling in of Mansel's patent railway carriage-wheel, which has for many years been considered the best for passenger carriages, as it is the only wood which will stand the tear and wear to which the wheel is exposed. The blocks are shown in their rough state as imported, and also in segments ready for use. A complete Mansel wheel is also shown. Teak railway keys are rapidly coming into use throughout Great Britain, the peculiar characteristics of this wood rendering it extremely useful and economical for this purpose, it being unaffected by heat, dryness, or moisture, while it is the only wood that can be used in close contact with iron without injury to either. The patterns shown are those used by three Scotch railways, and it will be noticed that two of those patterns are slightly tapered, the advantage of this form being that, while the keys can be more easily and firmly fixed into the chair, the wood retains all its elasticity. In the process of compressing and black-leading, which is generally a necessary feature in the manufacture of parallel keys (the form hitherto used in Great Britain), the valuable elasticity is greatly destroyed. From the small and refuse material are made step-ladders, and easels (the "Hatherly" patent), which from the lightness and rigidity of the wood are highly commendable. Two specimens of Robb's patent flooring are shown; one pattern is a sample of flooring for outside work, halls, &c., where considerable strength and great durability are the essentials; the other exhibits the patent as applied to flooring for public rooms.

The manner in which this wood can be employed in the most delicate work is shown in carved panels, cabinets, mantel-pieces, and articles of furniture. The Black-wood is another valuable tree largely used in the manufacture of artistic furniture, admirable examples of which are exhibited by Messrs. Proctor & Co., of Oxford-street. The Sisoo is another useful tree for wheel-work, it being related that the wheels of gun carriages which went through the tear and wear of the Afghanistan campaign

came back to India without a break-down having been recorded.

Amongst the specimens from the Andaman and Nicobar Islands is a slab, of great size, of the Poon (*Calophyllium Inophyllium*), having a colour similar to that of light polished mahogany. Another tree, of which there are beautiful logs, is the Padowk (*Pterocarpus indicus*) varying greatly in colour, some resembling cedar, others dark mahogany, and others having a dark scarlet tinge. Amongst the indigenous trees of these islands is the marble-wood (*Diospyros Kurzii*) with streaked markings of black and grey, which is used for cabinet-work. Fine specimens of ebony come from Travancore, which display the black heart-wood surrounded by the lighter coloured sapwood. The luxuriance of vegetation in the Indian peninsula is exemplified by the bamboos exhibited, some of which exceed 80 ft. in length. Other interesting products derived from the Indian woods are medicinal barks, gums, resins, oils, perfumery, and dyes. The collection would be incomplete without examples of the native carved work, interesting specimens of which are lent by Sir Philip Owen and by the authorities at South Kensington Museum. Her Majesty and the Prince of Wales lend heads of forest animals, and His Royal Highness and suite are shown taking part in a tiger hunt, in a picture which gives a graphic idea of the situation, the odds against the wild beast appearing tremendous.

In an interesting preface to the catalogue of the Indian exhibits, Sir George Birdwood, C.S.I., gives to Edinburgh botanists the credit of having first called attention to the necessity for forest conservancy in our great Eastern Empire. About thirty years ago the Department of Forestry was originated by the East India Company, an impetus having been giving to this important movement by the report of a committee on tropical forests, which was appointed at the Edinburgh meeting of the British Association in 1850. The grand primeval forests were up till that time subjected to wasteful clearing, a process which would in time have subjected large districts to a state of barrenness, as has been done in Afghanistan through the disforesting of the uplands of that once fertile country. The Indian Forestry Department is now a great State institution, giving employment to thousands of natives, whose work is exerting an ameliorative influence on the climate and physical conditions of the country. As a result of tree-planting along the frontier towards Afghanistan and Beloochistan, it is interesting to learn that within the last ten years there is a gradually increasing annual rainfall in the Punjab and in southern Afghanistan, northern Beloochistan, and Scinde. Not only has this result followed, but it also appears that the Forestry Department has proved a financial success. Before 1848, we are told, the forest revenue was trifling. In 1881-2 it exceeded 874,000*l.*, the expenditure being 557,000*l.*, leaving a surplus of no less than 317,000*l.*, and by the development of the vast resources of the country this source of revenue may be greatly increased. The area of the reserved forests of India is 40,000 square miles, that of the unreserved has not yet been ascertained. The surveying of the Indian forests is being rapidly pushed forward under the directorship of Major Bailey, R.E. During the past year 361 square miles were plane-tabled on a scale of 4 in. to the mile, and 83 square miles triangulated; and the result of these labours may be seen on the walls of the Indian Court, in the shape of over 100 excellent maps.

THE NEW "MADAME TUSSAUD'S."

THERE is nothing to detain the mere student of architecture in the new building which now gives shelter to the famous wax-work show. It is not Gothic, nor, indeed, of any other assignable style, yet it illustrates one principle of Gothic design,—it is eminently constructional. Within is a long room; without, a long box. The whole building is admirably suited to its purpose. It is lighted, as it should be, from the top; the effect of its glass domes is not displeasing, and some art has been shown in relieving the monotony of the long expanse of the south wall. The gorgeous staircase from Baron Grant's ill-fated mansion in South Kensington is probably as well housed here as it could be anywhere. Thereby we approach, at an easy gradient, to a gallery of works the chief interest of which is not artistic. Lawrence's portrait of William IV., which excited Hayden's wrath, presides proudly over the entrance-hall. The principal *salon* is a fine room, covered, suitably enough for its purpose, with a deep damask paper. To those unaccustomed to the splendour of courts, who regard statesmen with distrust, and pin not their faith upon princes, it suggests irresistibly how splendid a ball-room it would make, if this heterogeneous assemblage of rank and notoriety should take wings to itself and fly. We have one complaint against the show. The "Chamber of Horrors" is a mean apartment. De Quincey would have craved for these artists in murder a richer environment. Trade instinct, we should have supposed, would have suggested to Mr. Tussaud the propriety of giving to these favourites of the people a habitation at once richer and more awe-inspiring. They want some local colour; some more of the "trappings and suits of woe." They stand, huddled together, in a shabby, unfurnished chamber, altogether beneath their deserts. We are not that "shallow critic," decried by the great organ of the people, who "wonders at the public interest in great crimes, and finds fault with it." On the contrary, we do not wonder at all. We think, with De Quincey again, that a great murderer, like a great poet, must create the taste by which he is to be judged. But this he cannot do unless Mr. Tussaud will place him so that the full effect of his personality may make itself felt. As the room is at present arranged we may receive, indeed, a momentary shock: as from the awful resemblance between Charlotte Winsor and a college "bedmaker" of our early days; but we are not actually haunted by her memory. Finally, we must repeat that the arrangements for the reception of the "profession" are wholly inadequate whether we consider their own adventurous lives, or the number and high character of their admirers.

The life of Madame Tussaud herself is well worth study, and the works from her hands are infinitely the finest, as well as the fullest of interest in the exhibition. Her "Memoirs," published in 1838, twelve years before her death, contain most interesting records of the most terrible days of the Revolution. It requires no boldness of criticism to assert that there was genius as well as courage in the woman who produced those models of the murdered Marat, of the guillotined heads of Louis XVI. and Marie Antoinette, of Robespierre and the infamous Tinville. They are not pleasant sights, but they have a terrible historical interest. All these, and some more, were taken immediately after death by Madame Tussaud. She knew Voltaire, and, when no more than eighteen, took a model of him from life, which is, probably, the best work in the Exhibition.

Illustrations.

NEW HALL OF THE BUTCHERS' COMPANY.

THE ancient hall of the Worshipful the Butchers' Company, formerly situate in Eastcheap, was pulled down to allow of the completion of the Inner Circle Railway, and the widening of Eastcheap.

The design of Mr. Alexander Peebles, F.R.I.B.A., F.S.I., for the new hall in course of erection in Bartholomew-close, in the City, was selected by the Court of Assistants from those submitted in a limited competition.

The chief entrance, in the centre of the façade, leads to the lobby, which will be enclosed with a handsome oak screen with double doors, all glazed with coloured glass in lead quarries, and thence into the hall, from which will ascend a handsome stone staircase. The committee-room, clerks' offices, waiting-room, lavatories, dressing and coat rooms will be upon the ground story, and the court-room, ladies' drawing and retiring rooms, upon the first story, whilst the large hall will be upon the second story, this arrangement being necessitated by the limited area of the site. Upon one side of the hall will be a musicians' gallery.

The kitchens and other domestic apartments, and those for the housekeeper's use, are upon the third story, approached from the street by a second and separate service staircase. Upon the basement story, at the foot of the service stairs, there will be a kitchen porter's office, fitted with a goods lift to the kitchens; and the waiters' room and other necessary offices will also be upon the basement story.

The walls of the hall and court rooms will be finished with wainscot panelled dados, and most of the joiners' work will be of the same material. The stairs are to be of stone, and the corridors, landings, &c., paved with mosaic. Sanitation has received due consideration at the hands of the architect,—the drains being disconnected from the public sewer, and thoroughly ventilated upon Banner's system; whilst ventilation, which is so important in a building of this character, has also received due consideration, and each apartment will be supplied with foul-air extractors, and fresh-air inlets through which cool air in summer and warm air in winter will be supplied by the appliances of the Æolus Water Spray Company.

THE NOTTINGHAM PORCH, ST. MARY'S, BURY ST. EDMUNDS.

THIS, which forms the north porch of the large and interesting late church of St. Mary, at Bury St. Edmunds, has been measured and drawn by Mr. G. G. Wallace, whose drawings, as previously mentioned, received special commendation when submitted in competition for the Architectural Association Travelling Studentship. The moldings, which Mr. Wallace has carefully and conscientiously given, exhibit the characteristic weakness of the style in this class of detail, but the general treatment of the front is picturesque and original. The porch is—or was when we knew it—connected with the porch of the opposite church of St. James by an avenue of trees, forming a happy mixture of natural and artificial architectural effect. The illustration may have special interest for some of our readers just now, as the church is included in the list of buildings to be visited in the course of the forthcoming Architectural Association excursion.

NURSES' HOME, ST. MARYLEBONE INFIRMARY.

THE Nurses' Home at Notting-hill, opened by H.R.H. Princess Christian this week, has been erected by the St. Marylebone Guardians as an adjunct to their infirmary at Ladbroke Grove-road, Notting-hill. The establishment is intended as a training school for nurses, and is interesting as being the first of its kind attached to a poor law infirmary. The architects, Messrs. H. Saxon Snell & Son, have designed the building three stories in height, and the accommodation on the various floors consists of forty rooms, each 14 ft. long and 10 ft. wide, but one of them on the first-floor is fitted up as a kitchen, which will be found useful in cases of sickness. At the ends of the corridors, giving access to the various rooms, bath-rooms are provided, and water-closets and slop-sinks are placed in the corner towers, but they are cut off from connexion with the building by means of cross-ventilated lobbies. Immediately fronting the entrance to the building, and leading out of the vestibule, is a class-room, 33 ft. long and 25 ft. wide, and on either side are the apartments of the superintendent.

Each of the nurses' rooms has a fireplace, and, in addition, the corridors can be warmed by hot-water pipes, which run along one of the side walls.

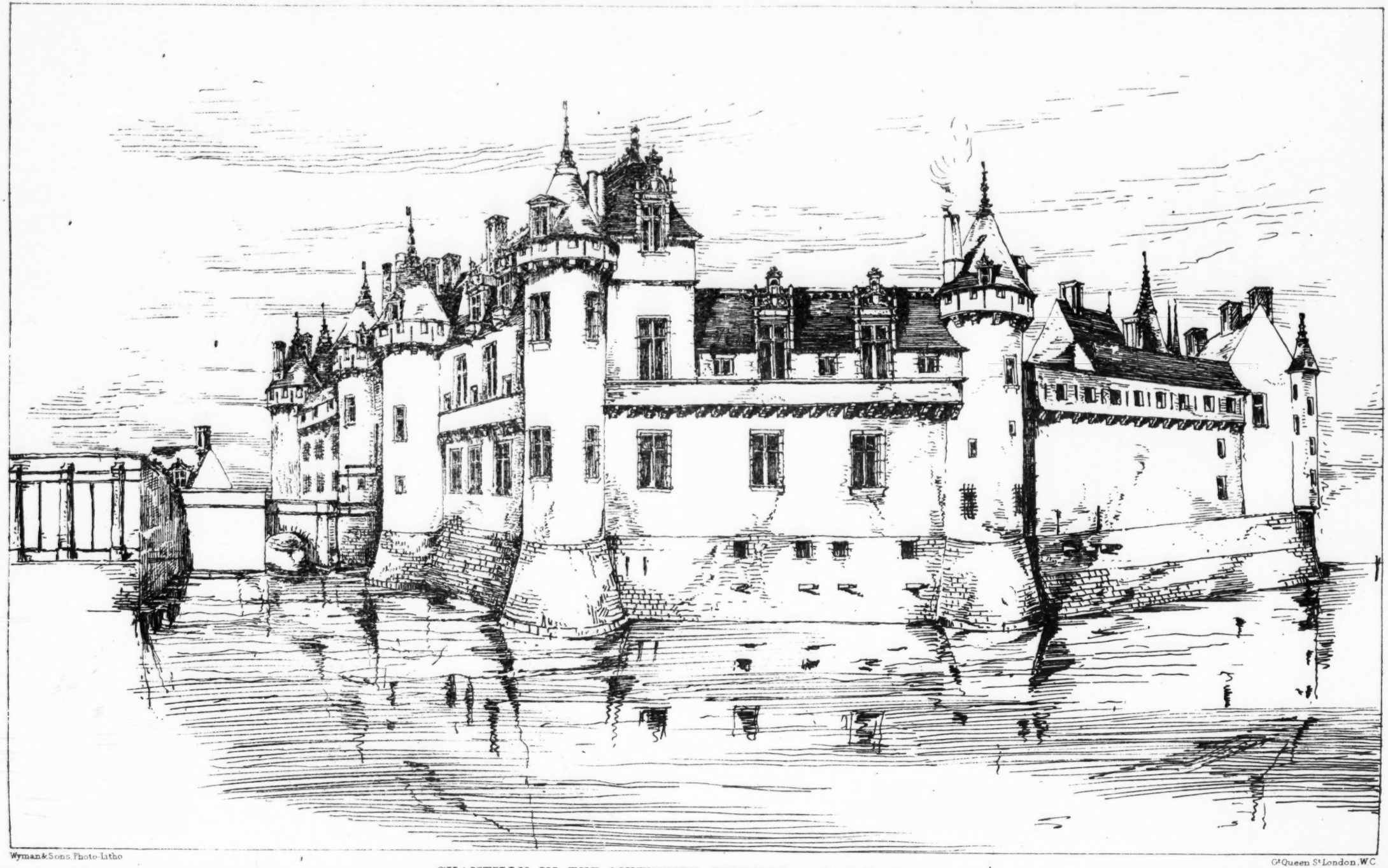
The builders, Messrs. Wall Bros., entered into a contract to erect the building for the sum of £8,993, inclusive of all engineering works and fittings. The heating works have been executed by Messrs. Fraser & Co.; the cold-water pipes and fire-mains by Messrs. Potter & Sons; the gas-mains and fittings by Messrs. Berry & Sons; and the electric-bells by Mr. F. Brown.

SCULPTURE AT THE ROYAL ACADEMY.

NOS. VII. AND VIII. BY H.S.H. COUNT GLEICHEN.

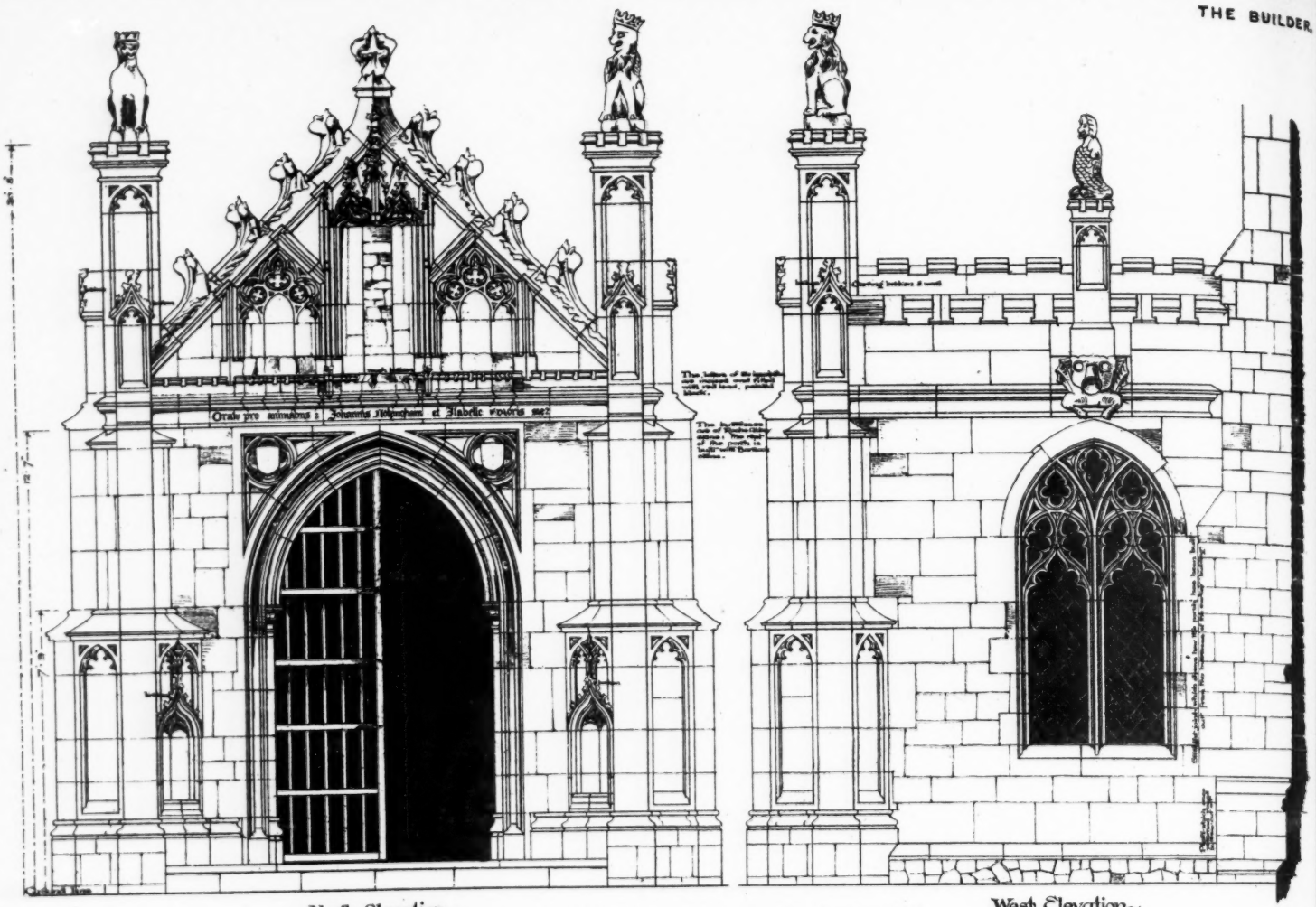
A GOOD many visitors in going round the Lecture-room will probably have noticed the very pleasing and dignified portrait-bust of a lady, by Count Gleichen, to which a certain additional individuality is given by the addition of the wings from between which it seems to rise; a pretty fancy, which gives a touch of poetic feeling to the portrait.

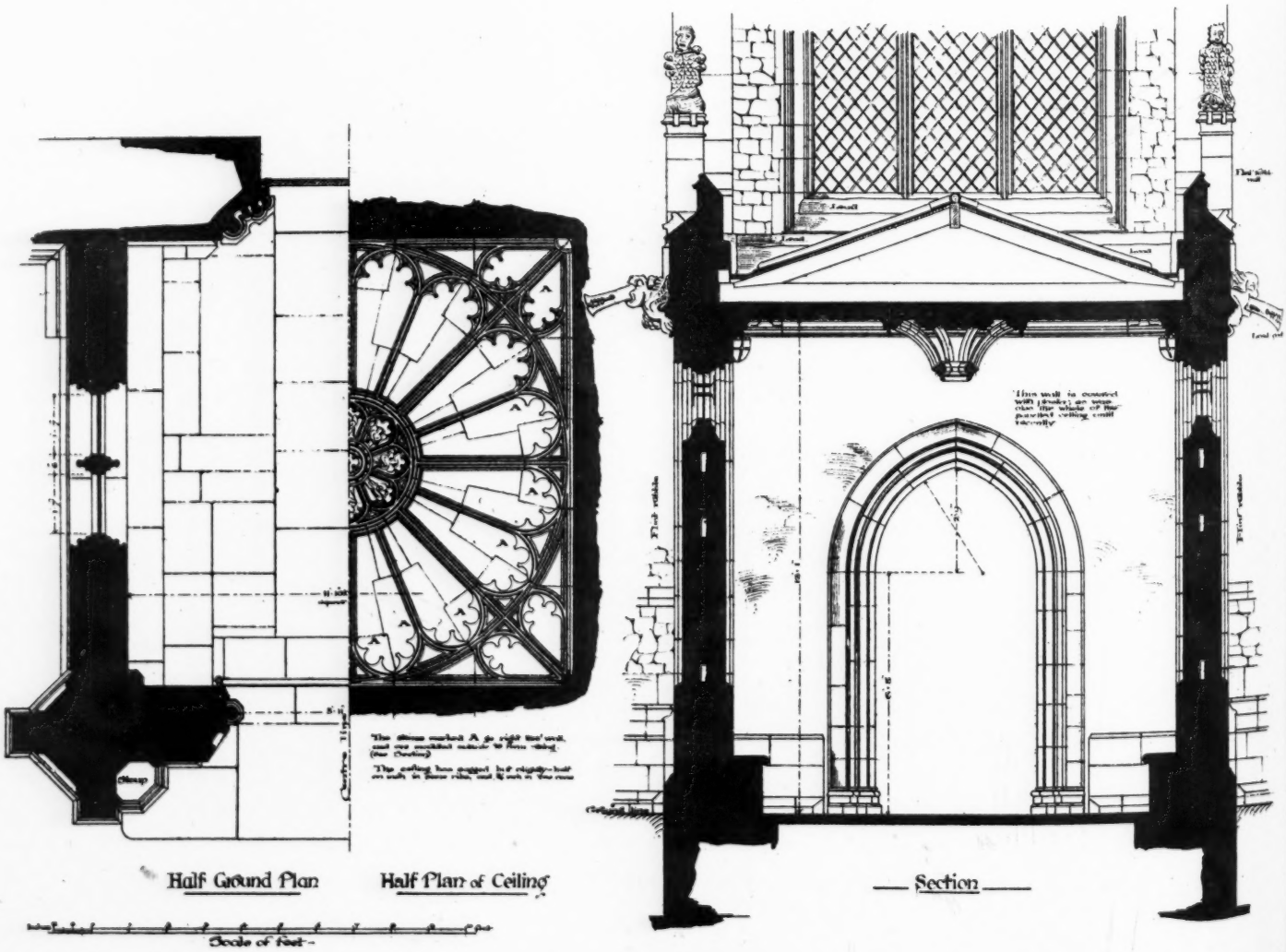
The studies of children given on the other plate represent a class of subject on which Count Gleichen has often been engaged. The boy with the toy engine is not, perhaps, a strictly "sculpturesque" subject, but the figure is very bright and characteristic in manner and expression.



Wyman & Sons, Photo-Litho. Gt Queen St London, W.C.

CHANTILLY IN THE SIXTEENTH CENTURY.—FROM DU CERCEAU.



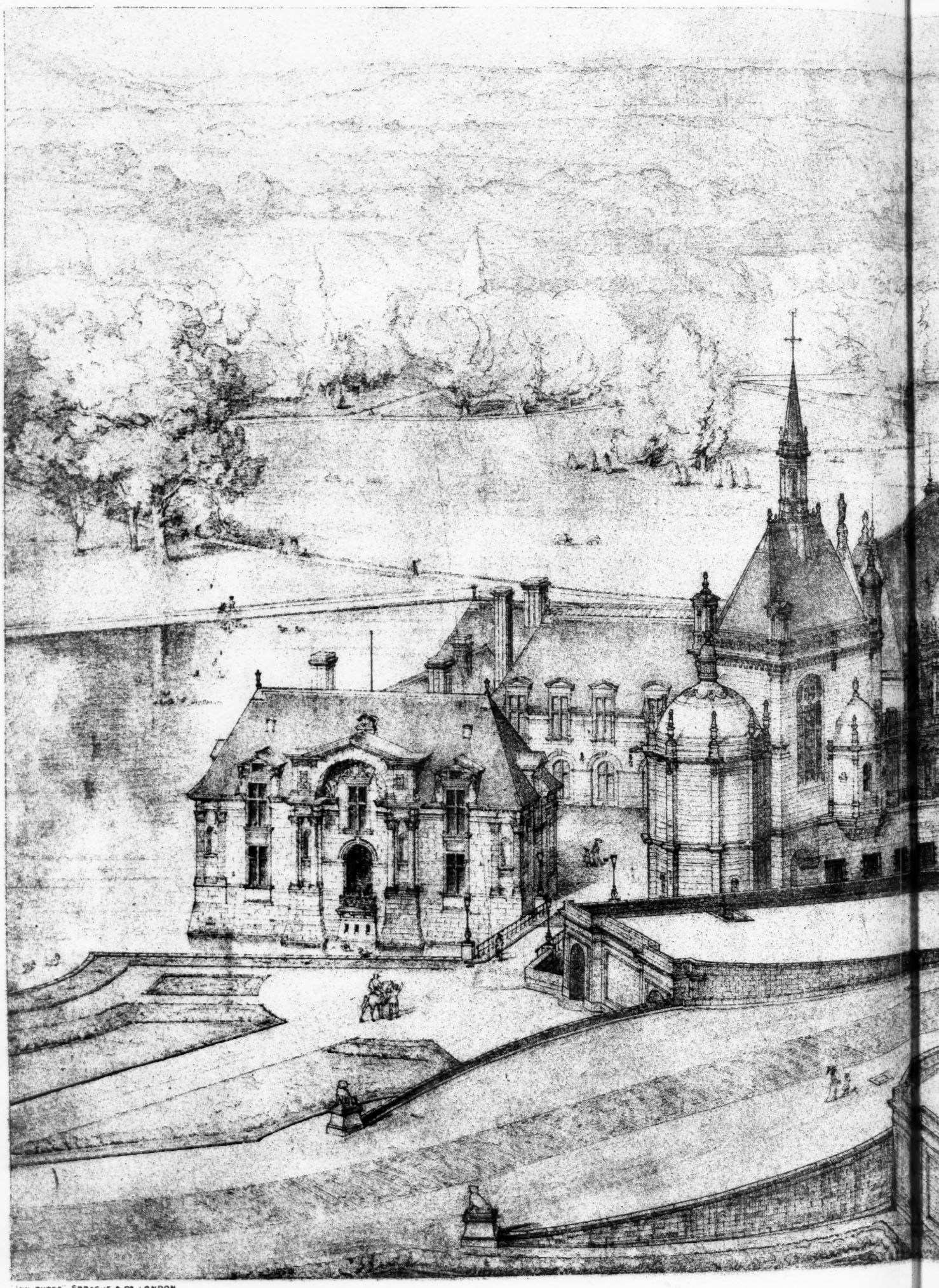


The Nottingham Porch · St Mary's Church · Bury St

"INK-PHOTO," SPRAGUE & Cº, LONDON.

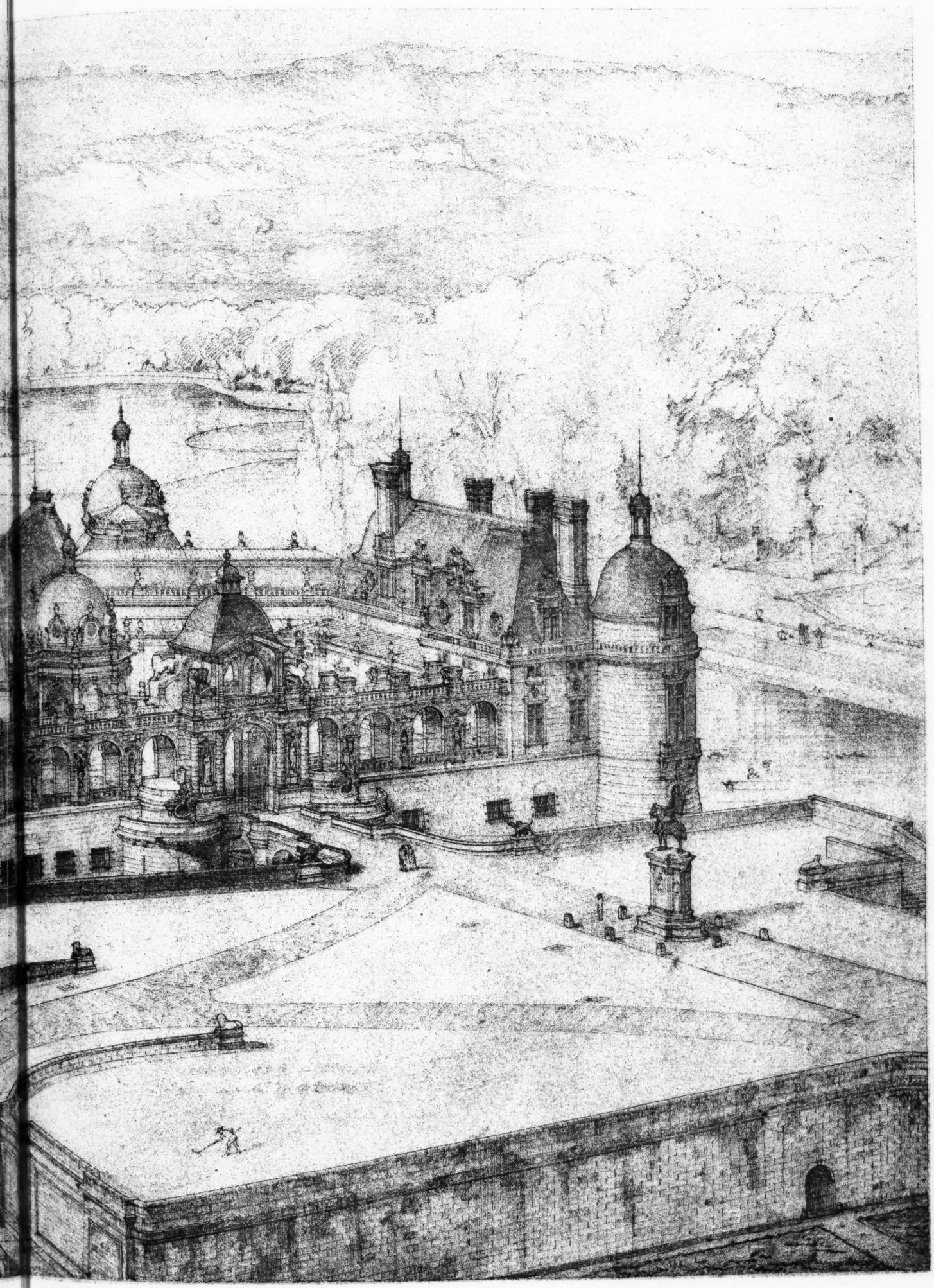
SCULPTURE AT THE ROYAL ACADEMY.

No. 7.—A PORTRAIT BUST. BY H.S.H. COUNT GLEICHEN.



INK-PHOTO: SPRAGUE & Cº. LONDON.

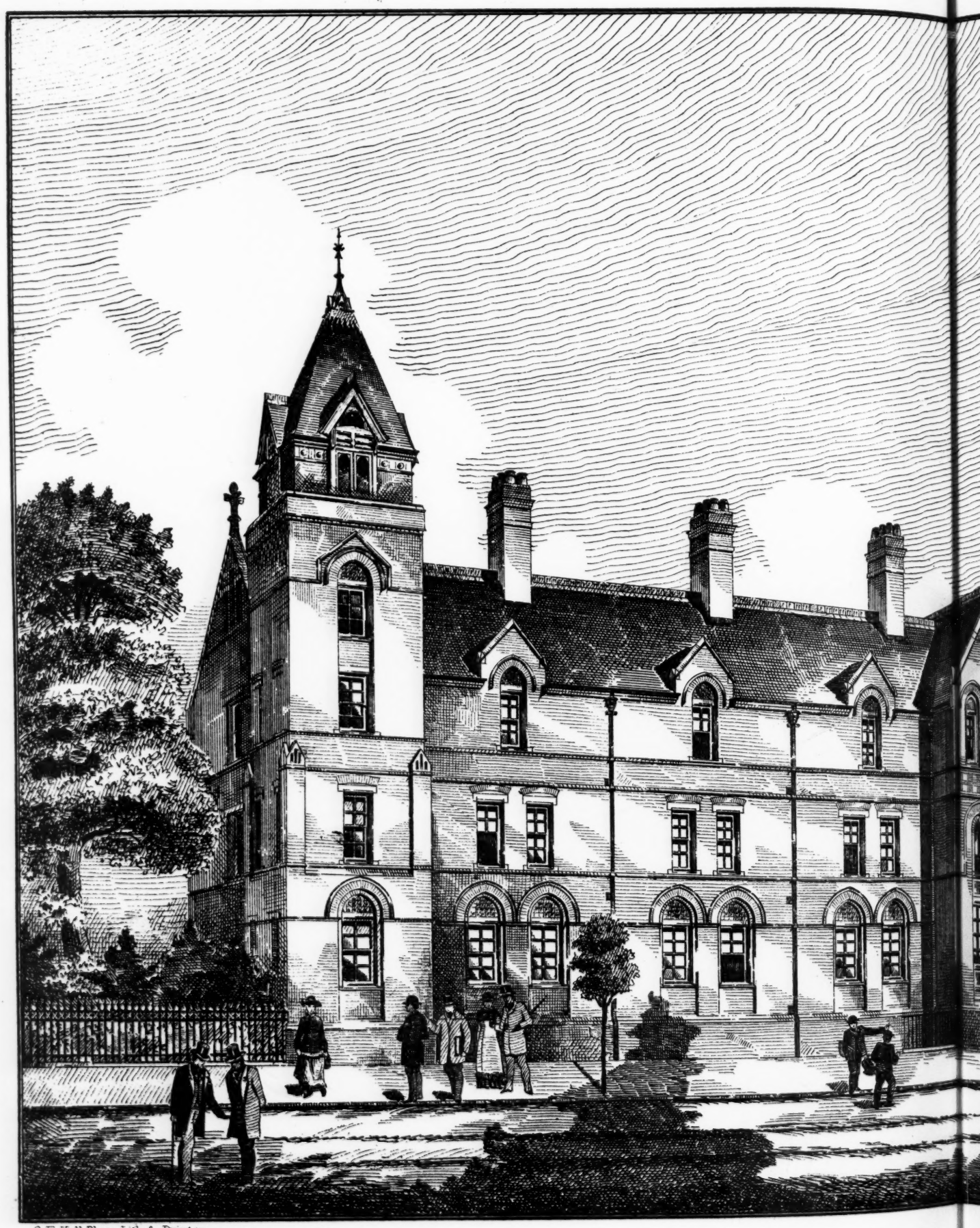
THE CHÂTEAU OF CHANTILLY: AS REST
GENERAL VIEW
M. HENRI DAUBY, A



AS RESTORED FOR THE DUC D'AUMALE.

ENERAL VIEW.

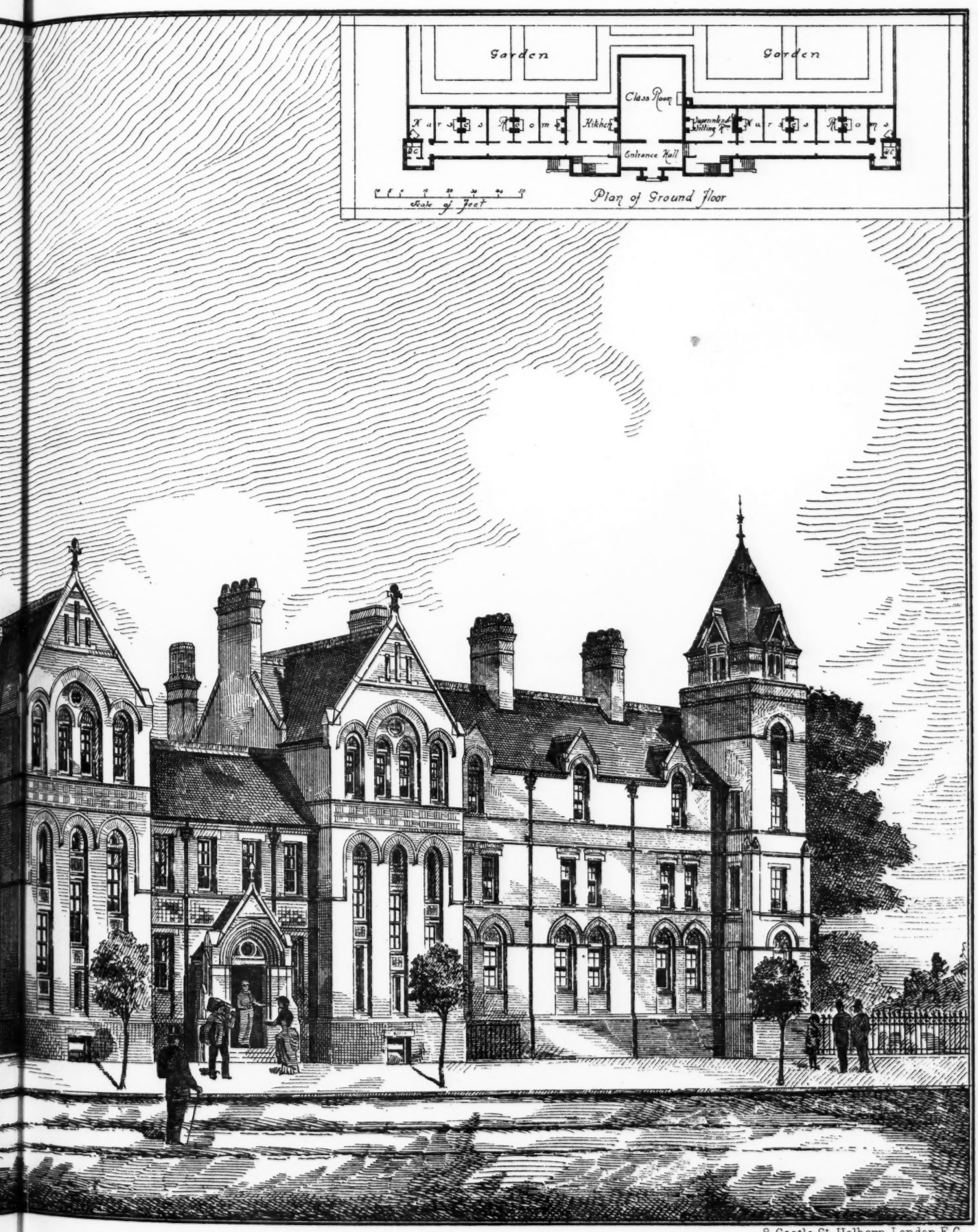
DAUBET, ARCHITECT.



C. F. Kell Photo-Lith & Printer.

NURSES' HOME, ST. MARY

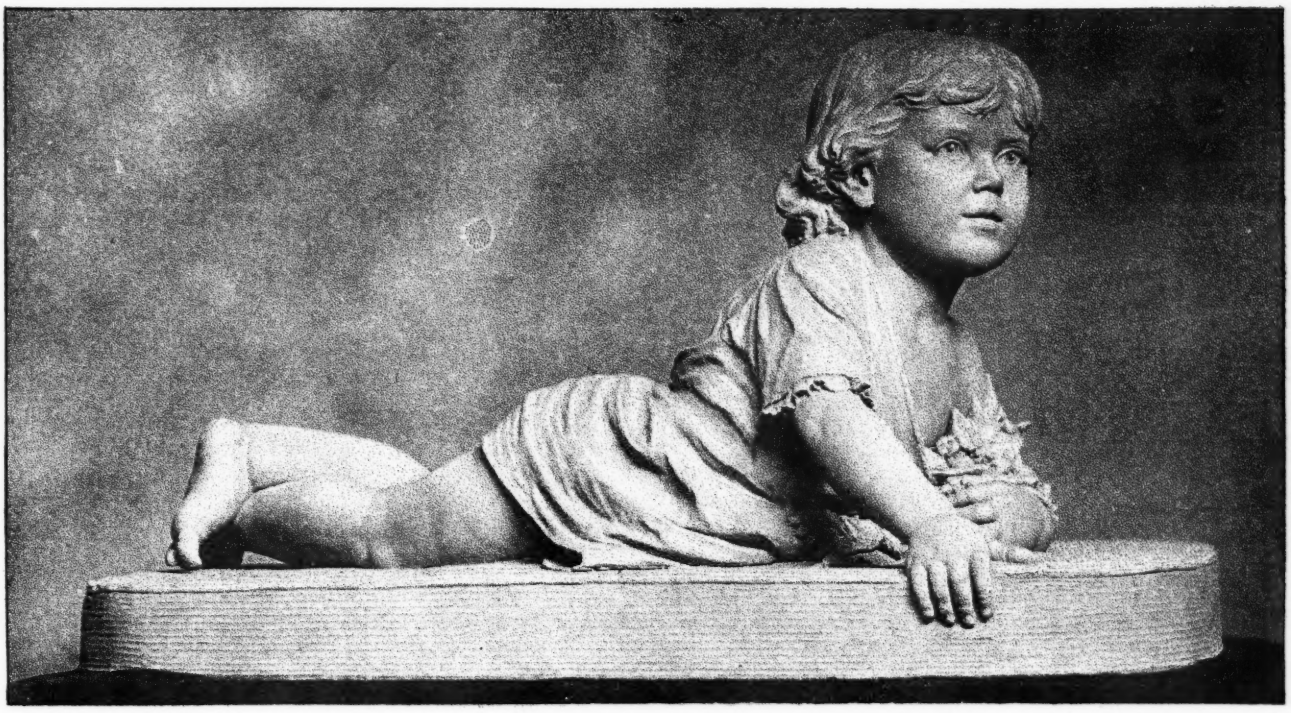
H. Saxon Snell & So



8, Castle St Holborn, London, E.C

MARYLEBONE INFIRMARY.

ILL & SON, ARCHITECTS.

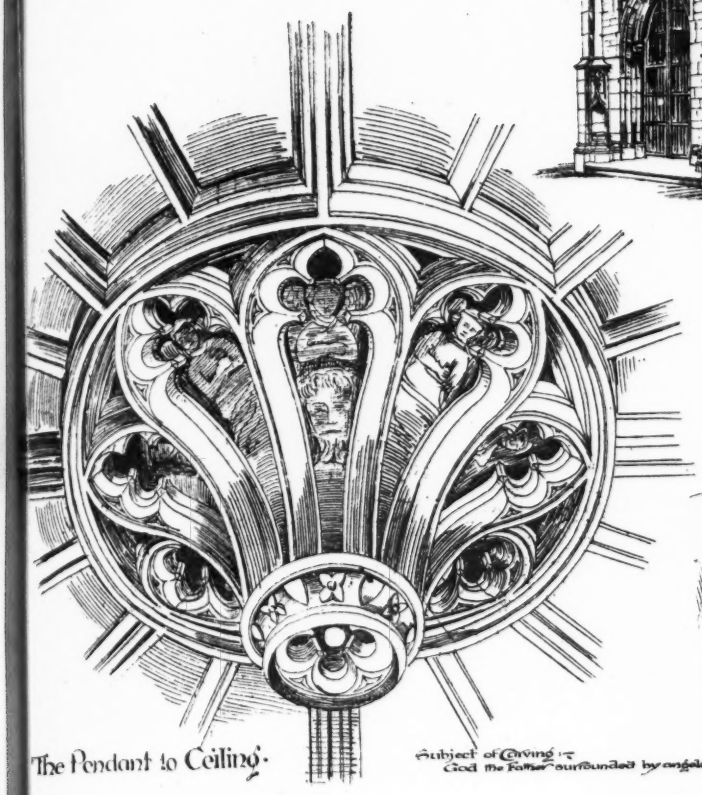


"INK-PHOTO." SPRAGUE & Cº, LONDON.

SCULPTURE AT THE ROYAL ACADEMY.

No. 8.—Studies of Children. By H.S.H. Count Gleichen.

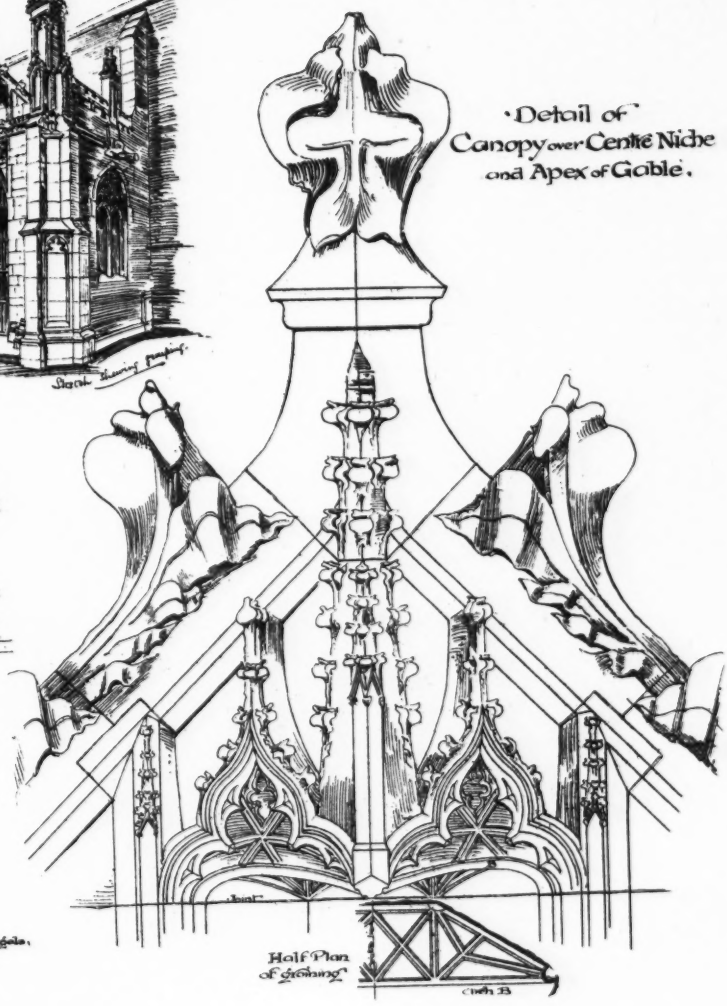
1884.



The Pendant to Ceiling.

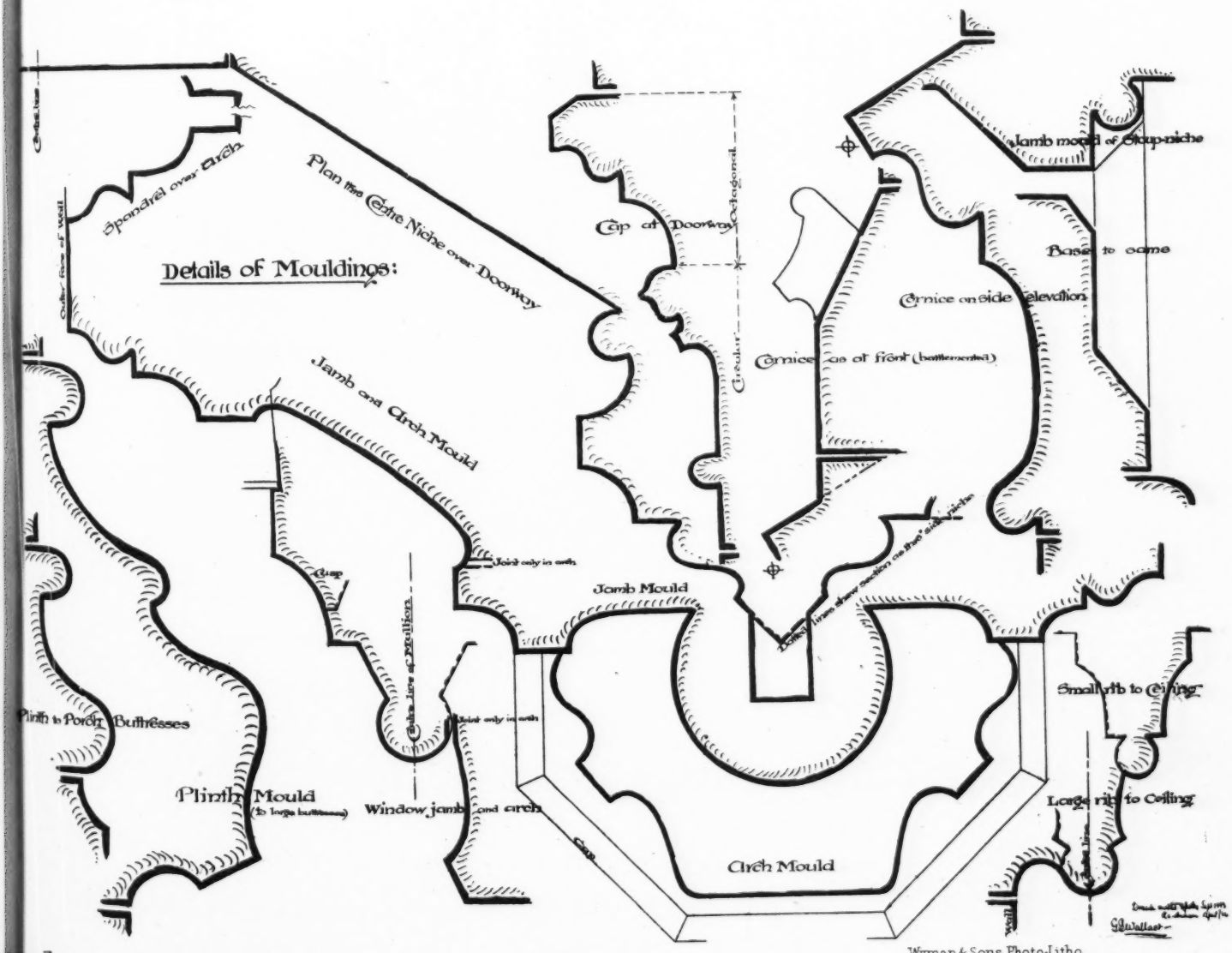
Subject of Carving is God the Father surrounded by angels.

Detail of Canopy over Centre Niche and Apex of Gable.



Half Plan of Ceiling

Arch B



Wyman & Sons, Photo-Litho.

Drawings measured and drawn by Mr. G. G. Wallace.

Hyman & Sons. Photo-Litho. 61 Queen St London. W.C.

NEW HALL FOR THE WORSHIPFUL COMPANY OF BUTCHERS.——Mr. Alexander Peebles, F.R.I.B.A., Architect.

THE INSTITUTE OF ARCHITECTS' CONFERENCES AT THE HEALTH EXHIBITION.

WATER SUPPLY.

THE paper on this subject by Mr. T. H. Watson, which was the concluding contribution to the Institute Conference at the Health Exhibition last week, we were compelled, as before mentioned, to hold over for want of space.

After having enumerated the various possible sources of water supply, from springs, lakes, and rivers, wells in the chalk, and rain-water, and regretting that the idea of storage of the latter on a large scale was still neglected, Mr. Watson continued—

The management of the water, after we have collected it and have got it delivered to our house, is the special subject of this paper.

In the metropolis there are at present two systems of delivery,—the constant and the intermittent. The latter is being gradually superseded. Much information on this and many other matters connected with the subject is published in the reports of Colonel Sir F. Bolton, the official water examiner appointed under the Metropolis Water Act, 1871. I do not understand that any effectual power is given by Parliament to compel the companies to deliver pure water. What is wanted is not a "standard of filtration" on which the companies may agree, but a "standard of purity and softness" on which the public may rely, and also we want "requirements," not exclusively with the object of saving water, but made also in the interests of the consumers, to facilitate the proper management of it within the house, and to insure the proper cleaning of all cisterns and tanks periodically. The perodical examination of cisterns as to their cleanliness, proper surroundings, and fittings, should be made the work of an independent public officer, acting under the direction of the sanitary authority entirely in the interest of the consumers, whether occupiers of private houses, chambers, clubs, hotels, or lodgings.

The great objection to the intermittent service is the much greater storage required in each house and consequent multiplication of cisterns and tanks, and the inconvenience of having to receive at a particular time the whole supply for twenty-four hours.

The constant service, however, requires fittings much improved on those which have been allowed to be used under the old system. The great hindrance to the introduction of this service is the expense and trouble involved in making the necessary alterations to the fittings to limit the waste of water.

The waste of water that may take place when the fittings are imperfect and the pressure is great, has led to the introduction of a throttle or ferrule into the communication-pipe, lessening the diameter of the water-way to such an extent that, when the pressure is reduced, the water may flow too slowly to be of effectual service. Some storage and a moderate pressure are, therefore, desirable. The constant system, to work effectually and economically, depends upon mutual fair dealing between the Water Companies and the consumers, but it is not easy to adjust things on this basis, and many persons advocate a mixed system. It is, therefore, important to consider the whole subject of cisterns and tanks.

Materials.—Stone, brick, or tile lined with cement, and puddled on the outside with clay, where the ground is porous, are found to be the best materials for tanks of large capacity. Soft water dissolves lime, but cement is not acted upon by any water. It may be trowelled smooth, and kept clean.

For house-cisterns, stone, slate, iron, lead, zinc, and other materials are used. Of these, perhaps slate is best, but it requires to be most carefully fitted and put together with slate cement and metal cramps. Iron rusts badly when alternately wet and dry; enamelled iron is expensive and uncertain, galvanised iron having a mere coating of zinc, which is dissolved by soft water, cannot be relied upon. Lead, of very ancient use, and its modern rival zinc, are also considered objectionable, and should not be used where anything better can be had. I think that stoneware is the best material for the house-cistern, and as the constant supply requires only a limited storage, say 100 to 200 gallons, there should be no difficulty in the general adoption of cisterns of this material, provided they are made and fitted in a way that will admit of their proper use.

Reservoirs for spring-water require to be fitted with means to aërate the water at the inlet. Large tanks must be thoroughly ventilated; all, without exception, require to be fitted with means to run the water off to the very bottom,—this is called "the wash-out," without which they cannot be effectually cleaned. A flap-valve and chain is the proper contrivance for this purpose. Tanks are usually constructed underground; it is sufficient, however, if they be half sunk in situations where the earth that results from the excavation can be heaped around and over them in a mound of sufficient thickness to protect the contents from changes of temperature.

The house-cistern requires to be close covered to keep out light, dust, and vermin, and no foul air should by any possibility find access to it. On lifting the cover (which should be kept clean) the whole interior of the cistern should be well lighted and in full view.

Most people would be shocked could they but look in the cistern of their house, but cisterns unfortunately are not usually placed where they can be looked into: the neglect of this is simply amazing.

The best system is to form a separate cistern room in a cool, light, and well-ventilated place in the upper part of the house; here the cistern stands just so much above the floor as will admit of the connexion of pipes, and give access to it all round. The cistern itself is close covered. The arrangement I make is this,—standing in front of it with the cover removed, you see the service-cock near the back right-hand corner, a solid tin trumpet waste to take the overflow and form a wash-out, rises from the bottom of the left front corner; the cistern is fixed a little out of level,—the left front corner about an inch lower than the right back corner,—to drain the contents away completely when the waste is out. The proper cleaning and rinsing out of a cistern thus arranged is the work of a few minutes. It is to be done every three or four months. No supply-pipe is taken from the bottom. At about an inch from the bottom the supply to the hot-water system is taken; 3 in. above this level the cold-water supply is taken in a pipe sufficient bore to serve all the lesser branch-pipes. The object of this is to let the cold supply fail first in the event of any interruption of the service; there are then 3 in. in the depth of the cistern reserved for the hot-water system until the service is renewed.

The under-waste should be syphoned below the cistern to form a trap; the pipe should be carried to some convenient place in the open air, where the end of it can be readily seen by the company's inspector; this forms an efficient "warning pipe." At the same time it must discharge in such a way as not to deluge the house when the contents of the cistern are being run off for cleaning.

The regulations issued by the Water Companies are rather misleading. They suggest that every waste-pipe must be converted into what is called an "overflow-pipe"; that is, a pipe taken out of the side of the cistern near the top, and this so arranged as to act as a warning-pipe. A cistern thus fitted cannot be properly cleaned out except by such an expenditure of time and trouble as is likely to cause it to be neglected altogether. In my opinion this form of waste-pipe should never be admitted. The "wash-out" and "waste," when properly fitted, answer every requirement as an overflow, and the end of this, equally with the other, is an efficient warning-pipe when properly placed in view.

The plumber has been so accustomed to perforate the cistern when in position,—considering only how he can best accommodate his work without regard to its subsequent cleaning out,—that prejudice is likely to arise against the use of the stoneware cistern. I think the plumber should give way in this, and cisterns might then be kept in stock sizes, and perforated as follows, viz:—

Stock size 3 ft. × 2 ft. × 3 ft. = 100 gallons effective capacity.
" 4 ft. × 3 ft. × 3 ft. = 200 " " "

Angles rounded in bottom and sides,—glazed brown, yellow, or white inside,—provision for service-pipe and waste-pipe as before described and for two supplies on the right side, near to, but not in the front,—the lower one to take connexion of 1 in. pipe, the upper one 1¼ in.

For drinking-water a separate cistern is recommended. It is not sufficient that this should differ from other cisterns only in being smaller and of a glazed material. Special arrangements must be made in its construction; these must be determined by a careful consideration of its special use and the means by which it may be kept in order.

My idea is that it should be smooth and white inside, so that no dirt could rest in it undetected; glazed and rounded, that it might be readily cleaned; no larger than is necessary, and so shaped that it might be completely emptied and set in order every day; deep, rather than shallow, with a close-fitting cover going over the top rim no larger than could be safely handled with one hand.

The water required for drinking purposes as water, and in beverages as tea, coffee, &c., is estimated at two pints a day for each person; we may double this during hot weather, and double it again, as we need not be sparing where there is such abundance. I should say that one gallon a day for each person would be ample for such a cistern, or say 1 cubic foot for each multiple of five persons in a family, starting at 2 cubic feet as a useful size for a family of ten persons.

This cistern should be fitted up in the pantry, still-room, or any clean cool place in the house; its front edge should stand on a hard wood drainer, such as is found by the side of the pantry sink. Let the cistern be in full light, accessible in every part of it, and resting on a projecting bracket, which may also serve as a shelf for glasses.

The bottom of the cistern should be rounded and sloping towards the front, where a ground-in porcelain plug should be fitted so as to enable it to be completely emptied. A porcelain tap, the parts simply and easily cleaned, should be immediately over the plug, and should not draw the water quite to the bottom. The overflow should be provided for by a slight depression in the front of the rim, so that any waste may be observed as it flows down in a channel in the front of the cistern to the drainer.

A glass ball-valve, supplied direct from the main, and not from any other cistern, completes the apparatus. This tap may be small, the metal nickel-plated, and the ball and arm must be capable of being turned up out of the way.

With a preliminary swill round and emptying, the plug is inserted, the ball turned down, and the cover put on,—the cistern is then charged. Every day, immediately before or during the intermittent supply, it is to be washed out with the remains of the last day's supply, rinsed out with the first of the fresh water, emptied again, and then set in order for the day. This would not take more than two minutes, and for that day, at least, the drinking-water would not be perceptibly worse than that which the Company supplies, while the addition of a pound of washed ice in summer time would give it just that degree of coolness that would render its use the more agreeable.

Of the other cisterns in the house I need speak but briefly. The hot-water tank should not be placed, as it frequently is, near to the cold water to affect its coolness. It is a mere accumulator or reservoir on the hot water circulation, and needs no special fitting beyond a manhole for occasional cleaning. It is best placed in the bath-room, where some of its heat may be utilised in a drying-closet.

Water-closets, urinals, &c., require waste-preventer cisterns. All those in use need improvement. The principal objections are that the incoming of the water is attended with noise: this may be obviated by taking the delivery nozzle down nearly to the bottom of the cistern; also the noise and want of force in the flushing of the closet. The valve should be contrived near to the pan, so that a column of water is standing above the valve ready to act the moment the valve is opened.

Where there is an open boiler a feed cistern is required. It has been the practice to put this in a dark cupboard, generally near the kitchen range. For this there is no necessity. It may be placed in any open light place where it can be got at all round; it only needs to be on the level of the boiler. It must have a close-fitting cover, and be kept quite clean. Stoneware is the best material for this purpose.

Too great a pressure upon pipes and fittings causes waste of water. It is advisable, in determining the place for the cistern, to arrange that the pressure does not exceed that which is due to about 25 ft. to 30 ft. head of water. In houses of many stories, with the hot-water system, this difficulty cannot be met, and a great want is a really efficient hot-water high-pressure tap.

In regard to the management of hot-water there are two or three points to be observed. The flow-pipes should always be fitted to a flange-joint on the top of the boiler and of the accumulator, the inner surface of which should be smoothly rimmed to prevent the formation of an air-trap,—the cause of the thumping and vibration often experienced. The flow-pipe should be of larger bore for a short part of its length immediately over the boiler, especially when the water is hard and much deposit is formed at the mouth of the flow-pipe. All supplies should be taken from the flow above the accumulator so as to draw the hottest water. Very short branch pipes should be admitted to hinder the dead water becoming cold and causing waste. The return should take the shortest course to the lower part of the boiler; the feed-pipe should be entered into the return so as to deliver the cold water direct to the boiler and not reduce the temperature of the whole volume stored in the accumulator. The feed should have an elbow or dip at its connexion with the return so as to hinder the hot-water ascending into the cold-water cistern.

Stop-cocks.—There should be a stop-cock on the "communication" pipe to enable the service to be shut off entirely. There should be a stop-cock in a convenient place on every supply taken from a cistern, to enable the workmen to shut off the supply without interfering with the other service of the house, or emptying the cistern when alterations in any of the fittings have to be made.

Distribution.—The conduits for distribution of water now in use are exclusively of iron when of large capacity, coated in various ways to hinder the action of the water in direct contact with the pipes, from rusting the metal away. For soft water the pipes are coated by Dr. Angus Smith's process, with a varnish of coal-tar, or by a coating of cement or lime, paid over the interior metal surface of the pipes. The joints which used formerly to be made with tow yarn and lead caulked in, are now, where the capacity of the pipe admits of it, made on the inside with cement, to hinder the increase of organic matter observed in water that was allowed to come in direct contact with the yarn. Hard water has little action upon iron pipes, a coating is formed by the earthy salts on the insides of the pipes, and contact with the metal is thereby hindered.

For the smaller pipes within the house, on the whole iron tubes are considered best. Various processes have been introduced for protecting the metal from contact with the water; where, however, the water is at all hard, the inconvenience of direct contact is soon overcome by the deposit formed on the inside of the tubes. For soft and hot water the protective processes of Barffing and galvanising are frequently used, but tubes thus treated do not admit of being worked up, or bent, without injury to the coating, and the only effectual way of employing either process is by taking down the whole of the work after it has been fitted, sending it away to be treated, and refixing the work without any alteration whatever: this becomes an expensive matter as the cost of labour far exceeds the value of the tubes. Wrought iron may be artificially coated with a deposit of lime after fixing, and, when kept well painted on the outside, tubes of this material are, perhaps, the best and most economical for hot-water work.

In the discussion which followed,

Sir Joseph Fayrer gave some interesting information about the water-supplies in India.

Mr. Grantham, C.E., considered that hot-water pipes were a source of great trouble in a house, and referred to an instance in which galvanised pipes, so used, got entirely stopped after a few years.

Mr. Schmidt, of Eastbourne, said that in that town they claimed to have a pure supply of water, owing to the liberality of the Duke of Devonshire. They had also a special Act requiring every new building to be carefully inspected. The death-rate there only averaged 13 per 1,000, and the water showed 9 degrees of hardness.

Mr. Ewan Christian, speaking of the action of water upon lead, stated that in the case of one old cistern he had found no deterioration. He was present some years ago at Canterbury when the ancient leaden pipes in the Close were being taken up, and he found they were as perfect internally as when they were laid down. As a contrary experience, he had put up a milled lead cistern in Lancashire, not knowing the quality of the water, which was entirely destroyed within a year. He had found the same thing occur in Surrey, and in the neighbourhood of Ascot it was almost impossible to use lead for cisterns or water-pipes.

In the course of some remarks at the close of the meeting,

Professor T. Hayter Lewis said:—I have now to declare that this week's Conference is about to close, and as it has been conducted under the auspices of the Royal Institute of Architects, it may be well that I should offer a few remarks respecting the part which the Institute and its various members have taken, from time to time, towards assisting in and bringing forward, prominently, the various questions of sanitary science, and the better housing of the poor and rich alike. The history of the movement which has resulted in the present Health Exhibition is briefly this. Some forty years ago Mr. Edwin Chadwick published his report on the sanitary condition of the labouring classes, and this was soon followed by the establishment of the society for improving their condition. In 1847, for the first time, householders were compelled to drain into the sewers. Shortly before this time the Institute came into vigorous life, thanks mainly to our dear friend, Professor Donaldson. In 1839–42 its first volume of Transactions was published, and amongst its articles are some on sewers, damp in foundations, hollow walls, warming and ventilation, filtering water, and artesian wells. All these were, of course, in addition to the valuable papers by Professor Willis and others on fine art and construction, and it furnishes, I think, a convincing proof of the interest taken by us in sanitary matters, at that time, no doubt, imperfectly studied.

It would be simply wearisome to give a lengthened list of the papers which have, since then, appeared in our Transactions, but I may be allowed to mention a few which have appeared in them and in other places by our members. In 1850, Mr. Roberts read a paper on the dwellings of the labouring classes, which has since been expanded into his well-known book on that subject. In 1851, we had the important subject of smoke-consuming, brought forward by Mr. Stevens. In 1852, Messrs. Ashpitel & Whichcord produced a valuable paper on baths and wash-houses, and in the same year the arrangement of houses in flats,—a mode of building which is now, at last, coming into use, and which was investigated, at a much later period, with great care by the present secretary of the Institute of Architects, Mr. White. In 1854, Mr. George Godwin published his well-known "London Shadows," a work which did much to rouse public attention to the housing of the poor. In 1854 there was read by Mr. Boulnois a paper on drainage, the discussion of which extended over three evenings, and will always be consulted as giving a clear account of the state of knowledge on the subject at that time. In the same year, Mr. E. C. Robins, one of the honorary secretaries of this Conference, who was then honorary secretary to a Local Board of Health, published his "Practical View of the Sanitary Question," a work which had a good practical result in many ways.

Amongst other subjects relating to health we have had the following treated at considerable length, taking them in the order of date:—Hospital construction, abattoirs, artisans' dwellings, house construction, heating and ventilation, public health, theatres, water supply, and model by-laws; and I conclude my list with a paper read a few sessions back, by Mr. E. C. Robins, on sanitary science in its relation to civil architecture, the discussion upon which, carried on by some of the most eminent men in various professions, occupied three evenings. For in all discussions at the Institute we invite the freest comments, not only from our own members, but from any visitors who can throw light upon the subject, whether their views are in accordance with ours or not.

We thoroughly acknowledge the great service done for the work by eminent men in other professions; we gladly accept their most valuable help, and we feel bound to keep well abreast with them in their scientific work, and to bring the results of their labours into a tangible form. And to bring them in the most practical way before our younger brethren, we have made it compulsory now for each associate before he is admitted into our ranks to pass an examination in which the leading principles of sanitation form a prominent feature. And it will serve as an encouragement to them in the pursuit of this knowledge to know that our past vice-president, Mr. George Godwin, has recently had presented to him by Her Majesty, at our recommendation, her gold medal, for his long, zealous, and able advocacy of the work in which we are all now engaged.

Before I conclude, I must call your attention for a few minutes to a fact which is constantly overlooked, and the omission of which is often made to bear somewhat hardly upon us architects, although, in reality, it ought to weigh more heavily on the speculating builders, viz., that whilst sanitation has been erected into a science within a comparatively short time, most of the houses in which we live have been erected a comparatively long time, and though the sanitary details of the best houses erected even a few years since may now appear to be, and often are, very defective, as judged by our present state of knowledge; they were, when put up, very probably up to the state of knowledge at that time possessed. To give a clear example of what I mean, I will take the case of typhoid fever, whose special properties were not known forty years ago, and whose origin in foul air is a still later discovery. But foul air was, nevertheless, always sufficiently offensive, and a thing to be fought against, and, a few years back only, it was the belief (I might almost say the universal belief) that a well-constructed water-trap was an effectual preventive to its entry into the house. Now it is known that foul gases will pass this water.

The progress of knowledge, and the difficulty of keeping pace with it, is curiously illustrated by Professor Corfield in his "Common Defects in the Sanitary Arrangement of Houses." He says (to give a short abstract) the form of trap which was used first in connexion with water-closets was the siphon, which was afterwards discarded, but which we now praise, and the trap which supplanted it was the D-trap, which we are now condemning, and taking out whenever we can. It is by no means unlikely that, in a few years, another discovery,—viz., that of Pettenkofer,—may effect a very considerable modification of both the external and internal finishings of our dwellings. His theory of the filtering of air through our walls and floors has not yet been thoroughly worked out, but it evidently has a very important and quite unexpected bearing on their construction.

INTERESTING DISCOVERY UNDER PETERBOROUGH CATHEDRAL.

IN connexion with the operations attending the rebuilding of the great central tower of Peterborough Cathedral, which operations were described at some length in the *Builder* of the 17th of May, a very interesting additional discovery has recently been made. It will be remembered that in excavating for the foundations of the new piers of the restored tower some buried masonry was exposed to view, affording indications of the strongest kind that herein had been come upon the remains of the ancient Saxon church, which, along with the bulk of the other erections forming the stronghold of the monastic colony, fell a prey to the Northmen. This discovery showed that the more modern and much grander church occupied the same site in part as that originally chosen in the seventh century, and it led to further speculation, on the part of those immediately interested, with reference more particularly to a traditional crypt or vault alleged to have existed under the flooring of the church. Following the rather vague indications afforded by one of the old historians of the cathedral and monastery, a fresh opening was made in the flooring of the building, at a spot in close proximity to the northern flank of the tower now being restored, and bordering the southern termination of the north transept. The success which attended the exploration seemed to be complete and immediate, and was held as showing the calculation, thus based upon the historic mention alluded to, to have been a very accurate one. Directly beneath the existing flooring of the church at this point the workmen of Mr. Thompson, the contractor, came upon a small underground chamber, packed to the brim with a very curious assortment of unconsidered trifles. The chamber was quickly cleared of its contents, when it was immediately apparent to the Clerk of the Works and other adequate authorities present that here had been stowed away part of the *débris*

remaining after the sacking of the building by the Parliamentarians in the year 1643. The very fine choir-reredos, at that time pulled to the ground with ropes on suspicion of strong leanings to Popery in the style of its ornamentation, had, it seems, been partly bestowed,—in fragmentary form of course,—within this hiding-place, and these fragments are now useful as showing the quality of a piece of art-work which, in the old times, was the object of so much admiration on the part of historians and others. Mixed with these were pieces of broken swords and other weapons of both iron and steel, also shreds of some kind of leather-work of the sheath order, fragments of stained glass, and some bones and half-burned bits of wood. The bones are judged to be those of the sheep chiefly, and it did not appear that any of them were of the human species. The underground chamber itself was found to be of no great size, being barely 7 ft. in length by about 3 ft. 6 in. wide and 6 ft. deep. It is furnished with two separate flights of steps descending to the basement, and was at one time approached, apparently, only by concealed traps in the floor of the minster, these traps in each case resting over the topmost steps. The walls of the underground chamber are of stone and lime, and the floor is of stone flags, which still bear signs of violent upheaval at some epoch of disturbance, —these most likely the handiwork of Cromwell's soldiers while in unscrupulous search of still more secretly contrived conveniences for the hiding away of valuables. The roof of the artificial cavity seems always to have been simply the floor of the church itself, which floor, as is well known, has at various times been slightly raised in level. If this is the crypt or vault mentioned in the old records of the building,—a theory which would bear some additional strengthening, perhaps,—its use in ancient times was in all probability that of a regularly contrived hiding-place for valuables. Its situation would be that most likely of any within the abbey walls to safeguard from sacrilegious attempts whatever treasure it might for the time contain. Its comparatively trifling dimensions rather militate against the supposition, however; for while the chamber thus discovered is not much more roomy than many a rather large-sized grave,—though it is, in point of fact, not at all of the tomb order,—the language of the old historian seems to point to a receptacle of some considerable capacity. The two flights of steps form the most striking feature, and have led the Dean to the theory that it was rather a place where means existed of obtaining water from certain large pipes, discovered at a considerable depth below the church, and extending up to its entrance. Other authorities on the spot, however, do not hesitate to identify this curious chamber with the actual "strong-box" of the old abbots.

NATIONAL ART-STUDENTS' COMPETITION.

THE drawings and other works sent in competition for the prizes given by "the Department" have been, as usual, open to public inspection this year in the Indian Courts in the main building. The authorities have separated the Gold, Silver, and Bronze Medal works from the rest on this occasion, so that they are not so difficult to find as formerly. In the main, decorative design seems up to the usual mark, —it is generally about the best portion of the work,—sculpture not quite so good as usual; life study much as usual, except one admirable drawing above the average mark. The Gold Medallists are Carl Amquist (West London School), holder of the Mence Travelling Scholarship, who has a good collection of coloured studies of Renaissance detail; F. Shelley (Hanley), designs for majolica ware, very good; C. B. Aylward (South Kensington), designs for textiles; F. Poole (Southampton), still life in water-colour, broader in style than usual in this class of the work submitted; A. C. C. John (we omitted to note the school), nude study in chalk, admirable; Ernest O. Cooke (Nottingham), still life in oil; Sidney G. Mawson (Manchester), decorative designs based on floral forms, elegant and refined, but a little too naturalistic; Constantine Procopides (Manchester), designs for printed calicos, very good; A. G. Weatherstone (West London), decorative schemes of semi-architectural character, clever but rather gaudy; Tonelli Dominico, sculpture in the round; Harold Forrester (Hanley), vase with figures in low relief; and — Willdigg, modelled terra cotta dish. We cannot go through the crowd of other awards, which, as we have often said, seem to be sown broadcast. We may observe that architectural work seems poorer than ever, and the things in this way, for which silver and bronze medals are given, are, as the Americans say, "a caution."

ELECTION OF TWO DISTRICT SURVEYORS.

TWENTY-SIX candidates presented themselves for the two vacancies caused by the death of the late Mr. Edwin Nash and by the Metropolitan Board of Works having decided to divide the hitherto single district of Penge and Lower Norwood into two separate districts named in accordance with the respective localities. The election took place at the meeting of the Board on the 18th inst.

The following is a list of the candidates, with the number of votes recorded for each in the preliminary voting for each appointment:—

Name.	Lower Norwood.	Penge.
Ashbridge, A.	27	23
Batterbury, T.	20	15
Bridgman, H. H.	13	12
Brooks, C. W.	7	8
Cheston, H.	9	8
Clarkson, S. F.	14	17
Edmeston, J. S.	18	15
Elkington, G., Jun.	29	28
Grellier, W.	5	6
Hazelhurst, E.	3	1
Hunter, P.	32	*
Inskip, G.	3	3
Jackson, G.	6	6
Lean, G. A.	3	3
Lees, W. H.	15	16
McLachlan, H.	11	8
Marsland, E.	25	27
Mundy, T. E.	14	13
Murray, R. C.	1	1
Nash, W. H.	3	3
Scrymgour, W. H.	12	8
Smallpeice, W.	10	14
Spiers, W. L.	10	10
Stevens, W. H.	14	10
Stock, H. W.	19	17
Street, E.	18	19

* Elected for Lower Norwood.

The subsequent voting was as follows:—

Lower Norwood.

	Second Vote.	Third Vote.	Fourth Vote.	Fifth Vote.	Final Vote.
Ashbridge	16	9	—	—	—
Batterbury	12	11	10	—	—
Elkington	24	26	21	14	10
Hunter	30	27	28	27	30
Marsland	16	13	16	10	—
Stock	10	—	—	—	—

Mr. Hunter was, therefore, the successful candidate for this district.

Penge.

	Second Vote.	Third Vote.	Fourth Vote.	Fifth Vote.	Final Vote.
Ashbridge	20	20	8	—	—
Clarkson	13	10	—	—	—
Elkington	26	25	23	25	25
Marsland	23	20	21	18	11
Stock	10	—	—	—	—
Street	23	12	16	13	—

Mr. Elkington was thus successful in obtaining this district.

Both appointments were made subject to the usual conditions imposed by the Board.

SWIMMING-BATH FOR WHITECHAPEL.

WE gladly give further publicity to the following on behalf of an object which should commend itself to all sanitarians:—

"Eleven years ago baths and washhouses were opened in Whitechapel. They have been a godsend to thousands to whom cleanliness had been an impossible luxury. It is now proposed to add a large swimming-bath, which shall be available all the year round, at a small charge. The Vestry has undertaken the expense of maintaining the bath, but justly shrinks from throwing the whole cost of construction on the ratepayers of a parish in which a penny rate produces only 600*l*. A thousand pounds is wanted to complete the sum necessary for the building of the bath. In a locality where the streets are so crowded that bodily exercise can rarely be a pleasure, where cleanliness is expensive and difficult, and where most of the families occupy single rooms, a swimming-bath will give to many greater length of days, and more joy in living.

Contributions towards this sum will be received by

F. D. MOCATTA, 9, Connaught-place, W.
S. A. BARNETT, St. Jude's Vicarage, Whitechapel."

About 600*l*. of the sum required is, we understand, already promised or subscribed. We hope some of our readers may be able to assist in making the remainder. There could hardly be a more useful or truly humanitarian expenditure of money.

FIRE-EXTINGUISHING.

SOME simple but crucial experiments in fire-extinction were carried out on Thursday last with the "Harden Hand Grenade" on a vacant plot of land near the Farringdon-street station, of which record may be usefully made. Fires under various conditions were lighted, with the result that they were extinguished in a few seconds by the application of the grenade, which consists of a small glass bottle containing one pint of a fluid which, on exposure to the air or to heat, generates a considerable volume of carbonic acid gas.

Supposing a fire to have been discovered in a house or elsewhere, a grenade is broken by being struck by a second one, or it is thrown against the surroundings of the fire with sufficient force to break it and disperse the contents.

One experiment made on Thursday was very telling, and illustrated a very common and useful application of the invention. A wooden chimney, 14 feet in height, and about a foot square in section, had a fire of wood, petroleum, and kerosene lighted in its lower portion. The flames rose quickly high above the top. But on a single grenade, containing a pint of the fluid, being broken over the fire at its base, the flames from the whole interior (which had been painted with oil and pitch) were most speedily subdued. This experiment illustrated the rapidity with which ordinary chimneys when on fire could be extinguished. For the invention, nothing more than its capability of dealing with incipient fires is claimed. It is not intended to supplant the extincteurs and hand-engines, still less the fire-brigades; and, consequently, the real point of value is its inexpensiveness, its handiness and readiness, and its efficiency for extinguishing fires in their incipient condition.

BUILDERS' BENEVOLENT INSTITUTION.

THE thirty-seventh annual meeting of this Institution was held at Willis's Rooms, King-street, St. James's, on Thursday last, Mr. Geo. Plucknett, J.P., treasurer, in the chair.

The annual report, read by the Secretary, Major Brutton, states that during the past year seven pensioners (six men and one woman) have died, and nine new ones have been elected (seven men and two women), making an addition of four pensioners. Two widows of deceased pensioners have also been admitted to the benefits of the Institution. The Committee have yielded to the urgent necessities of applicants, and have added to the numbers of the pensioners in the firm belief that it would meet with the general approval of the subscribers; especially as there are several more applicants of advanced age hopefully seeking to be elected. There are now fifty-eight pensioners on the funds of the Institution, and to support them the Committee earnestly appeal to all who read this report to become subscribers, if they are not so already, and thereby help to sustain the charity. Very valuable aid, which is greatly appreciated, was given by the president of the year, Mr. Henry G. Smith, to the Institution, and the thanks of the subscribers are due to the gentlemen who kindly and successfully superintended the arrangements for the annual dinner and ball. The committee regret the loss by death, year after year, of the friends of the charity. In the past year two of the late patrons have considerately remembered the Institution in their wills. The late Mr. Charles Hack bequeathed a legacy of 250*l*., and the late Mr. Henry Couchman 200*l*. These sums will be invested in accordance with the rules.

The balance-sheet shows total receipts from all sources during the year amounting to 5,266*l*. 2s. 9d., the total expenditure being 2,273*l*. 10s. 5d., leaving a balance in hand of 2,992*l*. 12s. 4d.

The report and balance-sheet were adopted, on the motion of the chairman, seconded by Mr. Bussell.

Votes of thanks were given to the president for the past year (Mr. H. G. Smith), to the vice-presidents, to the trustees (Mr. George Plucknett, J.P., Sir S. Morton Peto, Ald. Sir J. C. Lawrence, bart., M.P., and Mr. C. T. Lucas), to the treasurer (Mr. George Plucknett, who was re-elected), to the auditors (Messrs. J. H. Hunter, J. Cruttenden, and R. J. Ward), and to the committee, the retiring members being re-elected, and Mr. G. N. Watts was elected a new member of the committee.

On the motion of the chairman, seconded by Mr. Thomas Stirling, Mr. Stanley George Bird was elected president for the ensuing year; and it was announced that the annual dinner will be held at the Freemasons' Tavern on Nov. 6th.

After some discussion, in which the chairman, Mr. Stirling, Mr. F. J. Dove, Mr. Bussell, Mr. Foxley, Mr. T. F. Rider, Mr. W. Mitchell, and Mr. Hall took part, it was unanimously resolved to alter Rule 3, so that any future male candidate for the

benefits of the Institution must have been established in business for at least ten years, in lieu of five years, the limit hitherto fixed.

SOCIAL SCIENCE ASSOCIATION.

THE annual business meeting of the members of this Association was held at the offices of the Association in Adam-street on Tuesday last. A report from the Council, detailing the action taken by the Association during the twelve months ending June, was presented, and ordered to be received and circulated. The report dealt with several subjects of interest in regard to which special action had been taken, and among these may be mentioned the Fine Art Copyright Bill, promoted by a Committee of the Association; their Bill to amend the law as to the administration and devolution of the estates of deceased persons; the conveyance of land by the system popularly known as one for the registration of titles as opposed to a registration of deeds; the marriage laws; stolen goods; instruction in workshops; milk supply; loss of life at sea; the Hospitals Association, which was the outcome of the Conference on Hospital Administration held last year under the auspices and management of a special Committee of the Council; the International Health Exhibition. The following appointments in the Association for the ensuing year, 1884–5, were then made:—President, the Right Hon. G. J. Shaw-Lefevre, M.P.; Presidents of Departments: I. Jurisprudence, Mr. John Westlake, Q.C., LL.D.; II. Education, Mr. Oscar Browning, M.A.; III. Health, Dr. Norman Chevers, C.I.E., F.R.C.S. Eng.; V. Art, the Right Hon. A. J. B. Beresford-Hope, M.P.; Chairman of the Repression of Crime Section, Mr. J. S. Dugdale, Q.C., Recorder of Birmingham. Sir Richard Temple was appointed President of the Council. Mr. Westlake, Q.C., LL.D., and Mr. Joseph Brown, Q.C., were re-appointed as Foreign Secretary and Treasurer; and Mr. Andrew Dunn and Mr. Andrew Edgar, LL.D., were re-elected Auditors. The following were appointed Hon. Secretaries of Departments:—I. Jurisprudence, Mr. H. N. Mozley, M.A., Mr. Meryon White, M.A., Mr. Herbert A. Safford; II. Education, Mr. Rowland Hamilton; III. Health, Mr. H. H. Collins and Dr. Edward Seaton; IV. Economy and Trade, Rev. S. A. Steinthal and Mr. Edward J. Watherston; V. Art, Mr. Philip H. Rathbone and Mr. Arthur H. Mackmurdo, A.R.I.B.A.

It was reported that the arrangements for the Annual Congress, which is to be held at Birmingham from the 17th to the 24th of September, were in a very forward state.

SALES OF PROPERTY.

Building Sites at Clacton-on-Sea.—On Monday last Messrs. Baker & Sons conducted a large sale of building sites at Clacton-on-Sea. The sale took place by direction of the Marine and General Land, Building, and Investment Company, and comprised 100 plots of freehold building land, having frontages to the Marine Parade, Carnarvon-road, Pier-avenue, and other roads. The several lots offered varied in area from 18 ft. frontage and 80 ft. in depth, to 65 ft. frontage and 125 ft. in depth, the conditions providing that as to the smaller plots no houses of less value than from 180*l.* to 300*l.* were to be erected, and that as regarded the larger plots, the outlay on each house was to range from 500*l.* to 1,000*l.*, according to situation and area. On the various lots being submitted, there was an active competition, and ultimately sixty of the plots were sold at prices ranging from 20*l.* to 300*l.* each, the total proceeds of the day's sale amounting to 3,250*l.*

Freehold Property in Highbury.—During two days last week Messrs. Norton, Trist, Watney, & Co. were engaged at the Auction Mart in disposing of a quantity of valuable freehold property at Highbury The property consisted of thirty-six houses in Highbury-place, which were sold for 52,990*l.*, or an average of about 1,500*l.* each. Amongst the other property disposed of were five freehold houses in Highbury-terrace, which realised 7,180*l.*; two freehold houses in Highbury Park, sold for 2,660*l.*; and freehold ground-rents of 43*l.* per annum, which produced 1,860*l.*, the total proceeds of the sale amounting to 64,690*l.*

Freehold Ground Rents at Clapham.—An exceptionally heavy sale of property in Clapham took place at the Auction Mart last week, the sale being conducted by Messrs. Hards, Vaughan, & Jenkinson. The property consisted of freehold ground-rents and other freehold rentals amounting to 1,040*l.* per annum, with rack-rents in reversion amounting to 8,300*l.* per annum. The sale was by the direction of the trustees of what is known as the Bowyer estate, and comprised the ground-rentals on 185 houses, shops, and other premises in High-street, Manor-street, Little Manor-street, Cross-street, and other streets and roads in the locality. The property was divided into fifty-one lots, which realised prices ranging from 400*l.* to 3,900*l.* each. The highest sums obtained were for the several properties in High-street. Amongst these was a ground-rent of 60*l.* per annum, secured upon two houses and three shops in High-street, with reversion to the rack-rent (estimated at 275*l.* per annum) in 1894. This lot was sold for 3,900*l.* The ground-rent of 40*l.* per annum (increasing from 1890 to 125*l.* per annum), secured upon other premises in High-street, realised 3,500*l.* The reversion to this lot, the rack-rent of which is estimated at 450*l.* per annum, will take place in 1958. Three other ground-rents, of 80*l.* and 65*l.* per annum, upon properties in High-street, with reversions in seventy-four years, were sold for 3,040*l.*, 2,760*l.*, and 2,750*l.* respectively. The entire proceeds of the fifty-one lots amounted to 51,935*l.*, being an average at the rate of fifty years' purchase; but in some cases the leases had only about fifteen years to run before the purchasers come into possession of the reversion. Where the leases had seventy-four years to run, the prices realised amounted to from twenty-five to thirty years' purchase.

WAR-OFFICE COMPETITION.

SIR,—According to rumour, the finish in this race is likely to be a very close thing indeed.

The judges have only selected nine, instead of ten, candidates for the final struggle, and thus save 600*l.* It would be a gracious and a popular act, and help to mitigate the disappointment of those who were so very near winning the great prize, if this spare 600*l.* were divided amongst, say, the second and third in order of merit. H. P.

CAN THE NEW GOVERNMENT OFFICES BE DURABLE?

SIR,—In his notice of a proposal of mine on the above subject in the *Builder* of the 5th inst. [p. 9], M. Tagnon's recommendation of Belgian granite as a suitable material is altogether unsupported by evidence of its durability in our abnormal London atmosphere, with its destructive hydrochloric, sulphuric, and other gases.

So far as we may judge by his letter [p. 101], cheapness is its only value. But even upon this point he does not make out a very strong comparative case; for he tells us that it costs 15 per cent. more in this country than freestone. This compares badly with the 3 per cent. extra for the English granites referred to in my proposal.

In making these remarks I have no wish to depreciate Belgian granite, for I am entirely unacquainted with its qualities; but English architects know well that stone which has lasted for centuries without decay elsewhere utterly fails when used in London. The new buildings referred to by M. Tagnon at Bristol and Brussels are not evidence on this point; nor did Mr. Gough's letter supply much practical information as to Belgian granite. The absolute durability in London of the materials I recommended is proved by existing structures, which are from 20 to nearly 100 years old, and are as perfect now as when left by their builders. I am, therefore, at present unable to see that there would be advantage in the British Government going to Belgium for a new and comparatively unknown material when there are such durable, economical, and splendid resources in this country as those I referred to in the proposal you were good enough to print.

H. TRAVIS.

STREET PAVING.

SIR,—At the present season, when the imperative necessity of immediately removing anything that may contaminate the atmosphere, or serve as a medium for the dissemination of the germs of disease, is fully recognised, is it not much to be desired that our streets, and especially our back streets and slums, should be more generally paved with some material, such as asphalte, which, being non-absorbent and impervious, cannot retain any liquid impurity; while its perfectly smooth and level surface is not only washed down by every shower of rain, but, offering no obstruction to the free action of the broom, is kept perfectly clean with the greatest ease, preserving the atmosphere in a sweet and wholesome condition?

SANITAS.

HENLEY-ON-THAMES.

SIR,—It may interest some of your readers to know that the town of Henley-on-Thames is to be sewered on the "Shone" system, and Mr. Shone, the inventor, and Mr. J. Sturgeon, of Westminster-chambers, are engaged as engineers.

The town not being sewered before, Shone's system will be carried out in its entirety, and the inventor will have a good opportunity of proving the efficacy of his system, for the sewage will be lifted above 120 ft. to the outfall works, which will be situated about a mile from the town.

It is hoped the work will be completed by Midsummer next.

FREDERICK BALL, Town Councillor.

CARFERAL.

SIR,—In your review of a work by M. A. Wazon on the "Sanitation of Towns and Dwellings" in your issue of the 12th inst., it is stated, respecting filtering material, that "carferal is very costly." This statement, appearing in so eminent a journal as yours, is, we are afraid, unless corrected, likely to seriously affect us as the agents for Major Crease's Carferal, and we beg of you to allow us this opportunity of publicly stating that carferal, if used according to our direction, is a very cheap filtering medium. This, together with the fact of its being so eminently efficient, as proved by the series of trials it was subjected to at the Army Medical School, Netley, under the superintendence of Dr. de Chaumont, Professor of Hygiene, is the reason of its being so largely used by Government and other large bodies.

J. & C. CHRISTIE (late "Gardners"),
Sanitary Engineer, Charing-cross.

The Student's Column.

HINTS FOR THE STUDY OF THE HISTORY OF ARCHITECTURE.—IV.

GREEK.

IT is one thing to perceive the sources from which Greek architecture was derived; but quite another thing to point out the exact channels by which they reached their destination. It is difficult to say whether it was fetched or brought. We shall have been prepared, by the last article, for two elements, one of a graceful kind from Asia, with which the term "Ionic" will be connected, and the other of a stern kind from Egypt, with which the term "Doric" will be connected, and these elements, after passing through the refining crucible of Greek art, have influenced the architecture of all the nations of Western Europe (see Smith & Slater's "Classic Architecture," p. 80). "We cannot put a finger upon any features of Egyptian, Assyrian, or Persian architecture, the influence of which has survived to the present day, except such as were adopted by the Greeks. On the other hand, there is no feature, no ornament, nor even any principle of design which the Greek architects employed that can be said to have now become obsolete."

If we turn to the aboriginal inhabitants of Greece in order to see how far they are responsible for the invention of Greek architecture, we shall find the various accounts of them somewhat conflicting. However, they may be found in "Fergusson's Handbook," p. 255; "Ramée," vol. i., p. 373; "Rosengarten," p. 57; Gwilt's "Encyclopædia," p. 61; "Smith & Slater," p. 84; and Viollet-le-Duc's "Habitations of Man," p. 195. These, and all other authors, describe the Pelasgi, who, according to Fergusson, were by no means confined to Greece alone, but spread over Etruria (in Italy) and Asia Minor, and he adds that their power became extinct in Greece in the eleventh century B.C. The buildings attributed to them certainly testify to the Eastern influence that they would have encountered in Asia Minor, as may be seen by the scroll or voluted ornaments carved on a pillar in front of the Treasury of Atreus at Mycenæ, illustrated in all the handbooks at or about the pages just mentioned. At Mycenæ also is the famous Gate of Lions, so called from the pair of lions,—or lionesses,—supporting something like part of inverted column, base upwards. This, at least, is the explanation of this feature by Professor Hayter Lewis after a recent visit to the spot.

The Treasury itself is a circular chamber of the form of a pointed arch in section, the arch being formed not of radiating courses, but of stones oversailing until they meet in a point. The internal surface was probably plated with brass, as indicated in the large internal view of it in Gell's "Itinerary of Greece," showing the attachment of such plates.

Their wall masonry was of the kind known as Cyclopean, like the Peruvian walls; and Dr. Phené, in a paper read at the Institute (see "Loan Collection of Transactions," vol. i., page 138), has an ingenious theory that the polygonal outline of these huge stones is simply that of their natural fracture, in which form they were rebuilt, being raised into position on inclined planes, otherwise the labour of cutting and adjusting them would have been enormous.

So much for the Pelasgi, who appear to have combined massive building with graceful ornament, and who have been mentioned first because of the early buildings left by them.

The other, or Dorian race, says Fergusson, may have existed in Greece from the earliest ages, but only superseded the Pelasgi politically about ten centuries before Christ; but their civilisation took no new artistic form for at least three centuries afterwards, at which time what we know as the true Grecian form of art first made its appearance. It is in this Doric form that the Egyptian source of inspiration asserts itself; the tomb fronts at Beni Hassan, described in the last article, will have prepared us for the result so far as the columns are concerned; the small Egyptian temples called Mammeisi (see Fergusson, page 240) may have suggested the general arrangement; but it is a remarkable fact that the earliest Greek Doric building, the temple at Corinth, is as completely and distinctively Greek, as if it were the result of a long series of gradual developments. It is perhaps more remarkable that the little temple at Rhamnus, which has all the appearance of an early step in such a series, comes quite late in the chronological list (see Smith and Slater, page 101).

Regarding, however, the forms of Greek temples ranging from extreme simplicity to completion in all their parts, we may say that the *simplest* was a mere rectangular cell, that the side walls were sometimes continued to form a porch, that a couple of columns were introduced between these prolonged walls or *antæ*, producing the arrangement known as "two column" or *distyle in antis*, or that, instead of the antæ, two other columns were used, making "four column" or *tetrastyle*; tbat, if this were at one end only, it is called "front" or *prostyle*, and if repeated at the other end it is called "both front" or *amphi-prostyle*; that if the sides as well as the ends are then further enveloped in columns we have a temple with columns "around" it, or *peripteral*, the enveloping columns adding, at the ends, two to the four above mentioned, making "six," or *hexastyle*, front and back.

It is in this particular form, *hexastyle peripteral*, that the temple at Corinth bursts upon us in the seventh century B.C.,—simple, solid, and stern in style, but leaving nothing to be added to its complete arrangement as a temple. This would seem to indicate that this arrangement had been laid down in the form of instructions to the architect by some one who knew exactly what he wanted, probably the priest,—a process much to be desired in the present day, instead of the clergy screening themselves behind the knowledge of Mr. So-and-So, the eminent architect.

Ramée, whose chapter on Greek architecture will be found in vol. i., p. 373, says that, first of all, the sacred element must be entirely separated from all that is profane or public; hence the custom of building the chief temple of a town upon an elevated rock or *acropolis*, which also insured a stable foundation. In connexion also with the respect for sacred things are the three steps surrounding the entire temple; so that, beginning to ascend with the right foot, one lands also on the right foot. Next, the Divinity (represented by a statue) must be inclosed with solid walls in the space called the naos or cella, turned towards the east, in front of which is the pronaos, and then the porticus. The other end of the building is occupied by the opisthodomus or treasury, and then the posticum. The whole was covered with a span roof of flat pitch, the end gables or pediments forming convenient spaces for sculpture.

The columns, as has been said, have no bases, whereupon arises a difference of opinion, one author saying that the idea was taken from posts stuck in the ground, while other authors claim a stone original for these Doric columns and their capitals, although they claim a wooden origin for the entablature, or surrounding portion above the columns. There will always be some healthy fighting on this point; Viollet le Duc, in his "Lectures on Architecture," supporting the stone theory and illustrating it with his accustomed clearness. Moreover, in his "Habitations of Man," when speaking of the Ionic column, he says that the fact of its having a base is a proof that *it* was derived from a wooden original, such base being necessary to prevent the damp of the ground from rising and injuring the wood.

There is a great deal to be said about the beauties of Greek temples of the Doric "order," one of which, the Parthenon at Athens, built in 438 B.C. under Ictinus Architect and completed with sculpture by Phidias, is universally admitted to be the most beautiful building the world has ever seen. Illustrations of it will be found in all the Handbooks, and it is now time to mention the special works on Greek architecture to be found in the Library of the Institute.

First of all are the magnificent series of folio volumes published by the Dilettanti Society, and first of these for completeness and accuracy is Penrose's "Principles of Athenian Architecture," 1851. In this will be found wonderful measured drawings of the Parthenon. Wilkins' "Magna Græcia" and a second copy containing the original drawings for it, dated 1807, are a good example for study in these days of "flicked-in Q. A. Perspectives." The "Antiquities of Ionia," in four parts, dating from 1821, three having been published about that time and the fourth part in 1881. And there is Cockerell's "The Temple of Jupiter Panhellenius at Ægina and of Apollo Epicurius at Bassæ, near Phigallia in Arcadia." Besides the above there are other important folio works. Stuart and Revett's "Athens"; John Pennethorne's "The Geometry and Optics of Ancient Architecture, illustrated by examples from Thebes, Athens, and Rome," 1878; Sir Charles Fellowes's "Asia Minor," containing landscapes in which temples are shown to a small scale; Norman's "Parallels," that is to say, comparative plates of the Greek and Roman orders; Gell's "Itinerary of Greece" 1810; Fergusson's "The Parthenon, an Essay on the Mode in which Light was introduced into Greek and Roman Temples," 1883, one vol. quarto.

Besides these are the various papers at the Institute read and bound together as one volume of the Loan Collection of the Transactions, in which will be found "The Report of the Committee as to Colours on the Elgin Marbles," 1837; Tite on "The Mausoleum at Halicarnassus," 1858; Texier on "Perga in Pamphylia" 1863, and Remarks on the same, 1863; J. W. Papworth on "The Roof of Temples called Hypæthral at Ægina and Bassæ," 1866; Wood on "The Temple of Diana at Ephesus and Hypæthrum of the Greeks," 1877; Penrose on "Optical Refinements of Greek Architecture" 1877; Schliemann on "The Architecture of Troy," followed by a learned discussion, 1877; Phené on "The Architecture of Troy and Mycenæ"; Lysandros Kaftangoglioglu on "The Chæroneian Lion" and on "Recent Discoveries at Mycenæ"; and Fergusson on "Wood's Temple of Diana at Ephesus," 1883.

The student will soon become acquainted, in reading up the subject, with the difference between the simple Doric order, and the lighter and more graceful Ionic order, which is said to have succeeded it in point of date, as applied to an entire building. There are, however, buildings of the Doric order which contain some Ionic columns, such as the Propylæa, or entrance to the Acropolis, at Athens, which is dated 436-431 B.C. in Smith and Slater. There is another curious but well-known building on the same Acropolis called the Erechtheiom, which contains not only two temples joined together of the Ionic order, but a third tacked on to them, in which the office of the columns is performed by female figures called Caryatides, a copy of which may be seen in the church of St. Pancras in the Euston-road. The Temple at Bassæ, so beautifully illustrated by Cockerell in his work above named, contains not only Doric and Ionic columns, but Corinthian as well. This is an order with a foliaged bell capital and slender proportions, which is not often found in Greek architecture, though the Greeks invented it, with a hint perhaps from Egypt.

In all these temples there is room for considerable difference of opinion as to the method by which daylight was admitted into them, or into such parts as were not hyphæthral, that is "under,—or open to,—the sky." Cockerell illustrates simple openings left in the roof, but Fergusson continues to maintain that a sort of clearstory arrangement was adopted, which will be best understood by a visit to St. Peter's, Eaton-square, where M. Blomfield has ingeniously constructed such a clearstory into a church that is not unlike a Greek temple.

The choragic monument of Lysicrates, surrounded by Corinthian columns, may be seen copied on St. Philip's Church in Regent-street. The front of the British Museum, with its sculptured pediment will, if the return colonnades be concealed, convey a notion of a Greek Ionic temple; but "walk in, walk in," and see the actual examples of ancient Greek work in that splendid collection!

Miscellanea.

New Buildings in Gracechurch-street.—A new block of buildings has just been erected on the west side of Gracechurch-street, opposite one of the entrances to Leadenhall Market. The building has three frontages. The principal elevation is that in Gracechurch-street, which is 70 ft. in length, and upwards of 60 ft. in height, containing four stories above the ground floor. The lower portion of the façade is of red Aberdeen polished granite, with arched entrances to the upper floors at the north and south ends of the elevation. The facing of the upper portion of the frontage is in Portland stone, with a free introduction of carving. The frontage is ornamented, between the windows of the several floors, with fluted columns, the lower parts of the columns being in polished granite. At the north and south angles of the frontage there are pilasters of a rusticated and panelled character, the capitals being enriched by the introduction of sculptured figure-heads in the centre. The elevation terminates by an ornamental central pediment beneath which is inscribed "Woolpack-buildings," the name which has been given to the structure. Overlooking St. Peter's Churchyard, and approached from Gracechurch-street along a passage, is the north frontage, about 60 ft. in height. The other frontage is on the south side, in Corbett-court. The lower portions of this frontage are faced with Portland stone and polished granite, the materials of the upper parts of the elevation being red brick. The buildings have been erected from the designs of Mr. Thomas Dudley, and Mr. J. Bangs is the contractor.

The Thames.—It was felt while the Royal Commission on Metropolitan Sewage Discharge was sitting that some of the evidence given was exaggerated, and that the pessimist view taken of the matter by the medical officer of health for the port was scarcely justified by the facts. Unfortunately, however, the decision arrived at by the Commission has, during the recent hot weather, been far more than justified. It is no exaggeration to say that the whole river from Greenwich to Greenhithe has been full of sewage. The colour of the water is black and the odour intolerable. Such a state of things has naturally caused much anxiety. The Port of London Sanitary authority, alive to the danger, has addressed the Local Government Board, pointing out the necessity for immediate action. As a consequence pressure has been brought to bear upon the Metropolitan Board of Works, who have tardily agreed to the deodorisation of the sewage before it reaches the outfall. This, however, can merely be a palliative measure, the only real remedy being to remove the outfalls many miles further down.—*Lancet.*

Railway Crossing Gates.—Under the title of "Works in Iron," Messrs. Young & Co. issue a very useful and illustrative catalogue of practical ironwork, including some special descriptions of their opening and closing gates for railway level crossings, and the opening and closing apparatus which is worked from the signal-box, but with greater convenience than is possible with wooden gates. These gates are opened and shut by means of rods and chains working on wheels connected with the back stile of the gate. These wheels are covered in with cast iron "wells" or boxes. Part of the top of these "wells" is movable, permitting free and easy access to the underground workings. The rods are protected by underground channels, which can be of wood, brick, or iron. Easy access can be had to these at any time by removing part of the cover. The speciality of this system of underground workings for the gates consists in the fact that whether in opening or shutting them it is always accomplished by drawing the rods. In other systems the gates are drawn one way and pushed the reverse way. The advantage of a constant draw over alternate pulling and drawing is obvious.

Electric Gate Openers for Level Crossings.—A French paper says that the railway companies are about to try an electric gate-opener. The method to be tried is briefly as follows:—A catch connected with an electro-magnet keeps the gate closed. An approaching train closes the circuit at a certain distance from the gates, the catch is released and the gates open. When the last carriage has passed the circuit is broken again and the gates close. A bell is also rung as the train approaches.—*Electrician.*

Stanley's Patent Plastering Process.—The special feature of this process consists in substituting for the usual lathing-key for plaster a fine woven wire with an open mesh, and which is corrugated equal to the usual centre to centre spacing of joists. The wire is fixed with the concave side of the corrugations upwards, each ridge of the corrugation being fixed by staples into the soffit of a joist. The plaster, in laying, is forced right through the meshes of the wire, thus ensuring a very firm key besides placing a sufficient amount of plaster between each joist, behind the wire, to cut off all draught from one joisting space to another, and thus further check the liability to rapid combustion in case of fire, which the plaster itself, on a wire key, will, in first instance, offer considerable resistance to. The liability to the cracking of the plaster from shrinkage of the ground is also much diminished. The process, which is American in its origin, is one of the best substitutes for the antiquated and flimsy lathing system that we have noticed.

Smoke Abatement.—On this subject Mr. Ernest Hart delivered a lecture last Monday, at the Health Exhibition. He cited statistics proving the enormous amount of waste which is at present going on in regard to the consumption of coal. The result of the trials made by the Smoke Abatement Committee proved that on an average in London 42 per cent. of the total heat generated in domestic grates passed away without in any degree being utilised in warming the rooms of the houses. The thick pall of smoke which frequently hung over the metropolis was productive of very baneful results to health, the mortality during some weeks when fog had prevailed being equalled only by that caused by a heavy cholera epidemic. We may observe, however, that this involves the assumption that smoke plays a larger part in the composition of "London Fog" than has by any means been proved to be the case.

An Extraction Ventilator.—Mr. W. H. Chapman, who has had many years' experience in practical matters as a clerk of works, has patented an ingenious and what appears likely to be an efficient mechanical extractor for exhausting gas from sewers, and foul air from large buildings or from railway tunnels. The principle consists in propelling air through a pipe carried up to near the top of an exhaust chimney, and then turned into and around the circumference of the chimney, so as to produce a continual vortex at its mouth, causing a powerful suction up the chimney. Mechanical power, such as a gas-engine, is required to propel the blast up the pipe; but for ventilation or extraction on a large scale it seems likely to be an efficient and by no means expensive system.

Wrought-iron Watertight Casements.—We have received from Messrs. Burt & Potts, of York-street, Westminster, a revised prospectus and price-list of their well-known wrought-iron watertight casements and frames, which have been largely used for many years past, and are likely to continue in demand; for they are strong (though light in appearance), and well adapted to resist the entrance of water, even in in situations exposed to the most driving rains. The illustrative sections which are given will be found very useful for reference. Messrs. Burt & Potts, we may add, have just completed their contract for casements for the new building for St. Paul's School, Hammersmith, of which Mr. Alfred Waterhouse, A.R.A., is the architect.

Honour to an Architect.—The *London Gazette* of the 18th inst. contains the following announcement:—"The Queen has been pleased to give and grant unto Josiah Conder, esq., her Royal licence and authority that he may accept and wear the insignia of the Fourth Class of the Order of the Rising Sun, which his Imperial Majesty the Emperor of Japan has been pleased to confer upon him, in recognition of his services while actually and entirely employed by his Imperial Majesty beyond her Majesty's dominions." Mr. Conder, who is an Associate of the Royal Institute of British Architects, acted for some time as Architect to the Japanese Government.

Theatres.—Sir Henry A. Hunt has been appointed arbitrator in the matter of the appeal against the notice served by the Metropolitan Board of Works on the owners of the St. James's and Sadler's Wells Theatres, under the Metropolis Management and Building Act Amendment Act, 1878.

Tenders for Surveyor's Work.—One of the persons tendering sends us the following list of tenders for the completion of Survey and District Map, Burgess-hill, Sussex, for the Burgess-hill Local Board:—

Arthur Loader	£125 0 0!
C. O. Blaber	95 0 0
Charles E. Gritton	90 0 0
Frederick W. Hyde	63 0 0
E. J. Hamilton	55 0 0
H. C. Card	50 0 0
Samuel Denman	48 0 0
W. H. Nash	44 2 0
Thomas Hunter (accepted)	39 0 0!

We are surprised to find that so many as nine tenders were sent in, for we hold that the practice of tendering for professional work is one strongly to be deprecated. It would appear from the list that surveyors can be as much wide of each other in their "tenders" for a given piece of work as builders themselves are sometimes found to be.

New Flour Mills at Battersea.—A description is given in a recent number of *Engineering* of the mechanical contrivances in the large flour-mills just erected at Battersea for Messrs. Marriage, Neave, & Co. It may be noted that the owners have apparently desired to consider the architectural as well as mechanical side of the subject, having employed an architect, Mr. F. Bath, to design the mills "in the Queen Anne style." We should not have thought that style was specially suited for the architectural expression proper to a building of the class; but the intention to study architectural effect is at least to be commended.

Leeds.—In a competition instituted by Messrs. Milling & partners, Leeds, for the conversion of the old Corporation Gas-offices in Boar-lane, with an hotel, restaurant, and bodega, the designs of Mr. Nelson, architect, Leeds, have been awarded the first, and those of Mr. Jas. Ledingham, architect, Bradford, the second premiums. Mr. Watson, architect, Leeds, was the referee.

Leith.—The foundation-stone of a new Established Church at Lorn-street, Leith, was laid on Saturday, the 19th inst. The plans have been prepared by Mr. James Fairley, architect, Edinburgh, after the Gothic manner. There will be accommodation on the ground floor for 500 persons, and in the gallery for 395. The estimated cost is about 4,000*l*.

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITION.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Baths	Corporation of Stockport	£50, £30, £20	Sept. 15th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Paving, Kerbing, &c., Roads	Beckenham Local Brd.	Geo. B. Carlton	July 28th	xiv.
York Paving	Vestry of St. George, Southwark	*Official*	July 29th	ii.
Piers and Gates	Brighton Town Council	P. C. Lockwood, C.E.	July 31st	xiv.
Painting, Enfield Lock	War Department	*Official*	do.	ii.
Wesleyan Chapel, Brighton		C. O. Ellison & Son	do.	ii.
Repairs and Painting to Station Buildings	Midland Railway Co.	A. A. Langley, C.E.	August 1st	ii.
Covered Service Reservoir	Crewkerne Water Co.	T. & C. Hawksley	do.	ii.
Cleaning and Painting Stations	Midland Railway Co.	A. A. Langley, C.E.	do.	xiv.
Boundary Walls and Entrance Gates	Met. Asylum Board	Pennington & Bridgen	August 2nd	xiv.
Gasholder Tank	Wellingboro' Gas Co.		August 4th	ii.
Construction of Main Sewers	Sandal Magna Local Bd	Wm. Crutchley, C.E.	do.	xiv.
Patent Victoria Stone, and laying same	Aldershot Local Board	W. L. Coulston	do.	ii.
Girder Bridge, Eastbourne	L. B. and S. C. Ry. Co.	*Official*	August 5th	ii.
Station, Offices, &c., Horley	do.	do.	do.	ii.
Railway (one mile length)	do.	do.	do.	ii.
Reconstruction, &c., of Bridges	do.	do.	do.	ii.
Wood Paving	Vestry of Kensington	do.	do.	xiv.
Iron Galleries, Infirmary	Guardns of St. Leonard, Shoreditch	J. Wallace Peggs	August 6th	xiv.
Brick and Pipe Sewers	Willesden Local Board	O. Claude Robson	do.	ii.
Kerbing and Asphalting	Slough U. S. A.	J. Baker	do.	xiv.
Church Extension, Woodford Wells	Committee	E. Egan	do.	ii.
Granite, Flints, &c.	Bexley Local Board	E. R. Boulter	do.	xiv.
Cart-Shed, Stores, &c.	Wandsworth B. of Wks.	*Official*	do.	xiv.
Paving Works	Greenwich Bd. of Wks.	do.	do.	xiv.
Paving Bricks	do.	do.	do.	xiv.
Road Making and Paving	Fulham Board of Wrks	do.	do.	xiv.
Making-up Roads, &c.	Guardians of Kensingtn	A. Baker	August 7th	ii.
Concrete Reservoir	Driffield Water Co.	J. Fairbank, C.E.	August 9th	xiv.
Pipe-laying	Corporation of Burton-upon-Trent	James Mansergh	August 11th	xiv.
New Booking-Office, &c.	Hammersmith and City Ry. Joint Committee	*Official*	August 12th	xiv.
Coastguard Buildings, near Weymouth	Admiralty	*Official*	do.	ii.
Sewerage	Dorking Local Board	Smith & Austin	August 18th	xiv.
Construction of Dock, &c.	Corporation of Preston	Edward Garlick, C.E.	August 20th	xiv.
Alteration of Levels, and New Station, Liverpool	Lan. & Yorks. Ry. Co.	*Official*	August 25th	ii.
Ironwork for ditto	do.	do.	do.	ii.
Wesleyan Church, Herne Bay		Chas. Bell, F.R.I.B.A.	Not stated	ii.
School Buildings, Charlotteville	Guildford School Bd.	Wm. G. Lower	Not stated	xiv.
Alterations, &c., to Malt Kiln	P. Phipps & Co. (Lim.)	H. Stopes & Co.	Not stated	xxix.

TENDERS.

For the erection of artisans' dwellings, Gibson's Buildings, Stoke Newington. Messrs. Davis & Emanuel, No. 2, Finsbury-circus, E.C., architects. Quantities supplied by Mr. Frederick Downing, No. 7A, Whitehall-yard, S.W.:—

Holiday & Greenwood	£12,193 0 0
Macey & Sons	12,063 0 0
G. S. S. Williams & Son	11,983 0 0
Edward Conder	11,790 0 0
John Mowlem & Co.	11,619 0 0
Colls & Sons	11,617 0 0
William Brass	11,493 0 0
John Woodward	11,399 0 0
E. Lawrance & Son	11,124 0 0
John Grover (accepted)	10,843 0 0

For the erection of the first portion of proposed new buildings at St. Mary's College, Woolhampton, near Reading, Berks. Mr. Frederick A. Walters, architect, 4, Great Queen-street, Westminster:—

Norris	£5,884 0 0
Parmenter	5,560 0 0
Kemp	5,399 0 0
Kimberley	5,110 0 0
Claridge	5,071 0 0
Buckle & Wheeler (accepted)	4,350 0 0

For rebuilding Congregational Church, Robertson-street, Hastings. Mr. H. Ward, architect, Hastings:—

Dobson	8,240 0 0
Moon & Co.	8,200 0 0
Hughes	8,200 0 0
Rodda	8,100 0 0
Vidler	7,854 0 0
Peters	7,747 0 0
Jones & Co.	7,744 0 0
Taylor Bros.	7,598 0 0
Walker	7,500 0 0
Woods	7,500 0 0
Jenkins	7,450 0 0
H. E. Cruttenden	7,380 0 0
Bingham	7,300 0 0
F. Cruttenden	7,290 0 0
B. Foster	7,142 0 0
Higgs	7,120 0 0
Eldridge & Cruttenden	7,100 0 0
Howell & Son	7,000 0 0
S. Clarke	6,526 0 0

For heating the Presbyterian Church, Chester, with heir "small-tube" hot-water apparatus:—
John King, Limited, Liverpool £104 0 0

For heating the New Wesleyan Schools, Morley, with their "small-tube" hot-water apparatus:—
John King, Limited, Liverpool £208 0 0

For completing eight houses on the Colville Hall Estate, Forest-gate, for the Land Investment Company, Limited. Messrs. Whitmore & Reeves, surveyors, Devonshire-square, Bishopsgate :—

Barkel, Plaistow	£1,270	0	0
Rice, Peckham	1,120	0	0
Pollard, Forest-gate	950	0	0
Martin, Stratford	896	0	0
R. & W. Foster, Custom-House	818	0	0
Brickell, Manor Park	775	4	0
Beale, Cambride Heath	695	0	0
Sayer, Leyton	600	0	0
Richardson, Stratford	590	0	0
Feary, Goswell-road	590	0	0
Ditto ditto (reduced and accepted)	508	0	0

For alterations at the Poplar Union Workhouse. Mr. G. Morris, architect :—

Smith	£4,100	0	0
Sherwood	3,850	0	0
Howell & Son	3,720	0	0
Alexander	3,695	0	0
Denton	3,600	0	0
Stephenson	3,503	0	0
Hicks	3,496	0	0
D. D. & A. Brown	3,490	0	0
Robson	3,365	0	0
Aldridge & Jenvey	3,289	0	0
Walker	3,270	0	0
Johnson	3,128	0	0
Evans	3,054	0	0
Harper	3,040	0	0
Curnon	3,033	0	0
Hunt	3,026	0	0
Harris & Wardrop	2,994	0	0

For additions to the offices of the Hornsey Local Board at Southwood-lane, Highgate. Mr. T. de Courcy Meade, engineer and surveyor :—

Kerry & Son, Highgate	£6,770	0	0
Gibbs & Imber, Highgate	6,200	0	0
Houghton, King's-cross	5,628	0	0
Kearley, Kensington	5,585	0	0
Greenwood, Bermondsey	5,543	0	0
Nightingale, Lambeth	5,480	0	0
McCormick & Son, Canonbury	5,397	0	0
Wall, Chelsea	5,382	0	0
Tongue, Plumstead	5,250	0	0
Lawrance & Sons, Wharf-road, City-road (accepted)	5,243	0	0

For the erection of warehouse, offices, &c., at Millwall, E., for Mr. J. T. Morton, under the superintendence of Mr. William Eve, architect, 10, Union-court, Old Broad-street, E.C. :—

Perry	£4,501	0	0
Brown	4,466	0	0
Holland	4,400	0	0
Heiser	4,331	0	0
Linn	4,195	0	0
Salt	3,995	0	0
Higgs	3,900	0	0
Downs	3,860	0	0
Harris & Wardrop, Walwood-street, Limehouse (accepted)	3,833	0	0

For new building on the site of Muggeridge's Granaries, Queen Victoria-street, E.C. Mr. Wimple, architect :—

Lawrance & Sons	£13,797	0	0
Dove Bros.	13,755	0	0
Hall, Beddall, & Co.	13,250	0	0
Ashby & Horner	13,079	0	0
Colls & Sons	12,995	0	0
Morter	12,879	0	0
Scrivener & Co.	12,841	0	0
Brass	12,473	0	0

For alterations and additions to Messrs. A. Boake & Co.'s Chemical Works, Stratford. Mr. Richard H. Hill, architect, No. 9, Clement's-lane, Lombard-street :—

Morter	£997	0	0
Perry & Co.	971	0	0
Allen & Sons	949	0	0
Gregar	937	0	0
Holland	897	0	0
Bangs & Co.	896	0	0
Martin Wells & Co.	875	0	0
Norton & Sons	874	0	0
Harris & Wardrop	840	0	0

For the erection of Liberal Club at Great Grimsby. Mr. Charles Bell, F.R.I.B.A., architect, London and Grimsby :—

T. Summerson	£3,756	0	0
A. Haywood	3,477	0	0
J. G. Smith	3,361	0	0
N. Kirk	2,995	0	0
Willows & Roebuck	2,955	0	0
Nightingale & Danby	2,949	0	0
Tolland Chapman	2,910	0	0
Riggall & Henries (accepted)	2,675	0	0

For the erection of a Wesleyan Chapel, Grays, Essex. Mr. Chas. Bell, architect. Quantities by Mr. Henry Lovegrove, 26, Budge-row, E.C. :—

Prentis & Co.	£3,601	0	0
H. J. Carter	3,210	0	0
J. Anley	3,060	0	0
J. Brown	2,972	0	0
J. Baxter	2,796	0	0
Thompson & Son	2,786	0	0
Everett & Son	2,775	0	0
Geo. Green	2,742	0	0
W. H. Archer	2,740	0	0
W. Wood	2,603	0	0
Brickell	2,400	0	0

For the erection of bailiff's cottage and farm buildings on the Corporation Farm at Hampton Park, Hereford, for the Hereford Town Council. Mr. J. Parker, city surveyor :—

Edward Powell, Hereford	£133	0	0
George Hudson, Hereford	402	11	6
Wm. Cullis, Hereford	400	0	0
H. Welsh, Hereford	391	0	0
Jas. Davies, Hereford	380	0	0
Jas. Watkins, Hereford	377	10	0
Gardiner & Co., Hereford	375	0	0
A. J. Colley, Hereford	360	0	0
Jas. Collier, Hereford (accepted)	317	10	0

[Surveyor's estimate, £380.]

For the erection of new stabling, kitchen garden, and terrace walls, &c., at Sandhurst, for Lieut.-Col. Harvey. Mr. W. Ravenscroft, architect, Reading. Quantities by Messrs. Cooper & Sons, Reading :—

Grover, Reading	£2,894	0	0
Lawrance & Sons, Wharf-road, N.	3,830	0	0
Margetts, Reading	2,752	16	8
Smallwood & Co., Birmingham	2,750	0	0
Thos. Higgs, Goring	2,641	16	8
Rider & Son, 181, Union-street, Southwark	2,588	0	0
H. Higgs, Reading	2,548	0	0
Fearle, Reading	2,520	0	0
Bottrill, Reading (accepted)	2,373	0	0

For the erection of a house in the North Common-road, Ealing, for Mr. J. Lee Thomas. Mr. Robert Willey, architect, 66, Ludgate-hill, E.C. :—

Green, Clapton	£2,850	0	0
Lathey Bros., Battersea	2,530	0	6
Penny & Co., Ealing	2,340	0	0
Waters, Ealing	2,127	0	0
Macey & Sons, Strand, W.C.	2,125	0	0
Nye, Ealing (accepted)	1,979	0	0

For the erection of a house at Harlesden for Mr. E. Powell. Mr. Robert Willey, architect, 66, Ludgate-hill :—

Standen, Harlesden	£1,265	0	0
Tennant, Willesden	1,220	0	0
Waters, Ealing	1,158	0	0
Nye, Ealing	1,150	0	0
Bailey, Ealing	1,123	0	0
Penny & Co., Ealing	1,116	0	0

For the erection of warehouse, &c., Theatre Plain, Great Yarmouth, for Mr. W. G. Knowles. Messrs. Bottle & Olley, architects, Great Yarmouth :—

M. Barnard	£1,532	0	0
Rand & Cooper	1,266	0	0
R. Davy	1,248	0	0
E. Howes	1,244	0	0
J. Leggett	1,240	0	0
T. Howes	1,230	0	0
J. W. Bray	1,199	0	0
Cork & Beech	1,198	0	0
J. S. Cooper (accepted)	1,184	0	0

For the erection of first portion of a curate's house to the St. Paul's Mission Church, for the Rev. Canon G. Venables, vicar, Great Yarmouth. Messrs. Bottle & Olley, architects :—

Cornish & Gaymer	£985	0	0
Cork & Beech	927	0	0
T. Howes	890	0	0
J. Leggett	859	0	0
G. Nickerson	848	0	0
E. Howes (accepted)	802	10	0

For the erection of a class-room to the Cobholm Island Board School for the Great Yarmouth School Board. Messrs. Bottle & Olley, architects :—

B. Springall	£201	0	0
J. W. Bray	193	0	0
J. Leggett	187	0	0
Cork & Beech (accepted)	179	10	0

For the erection of a class-room, &c., to the St. James's Church Schools, Great Yarmouth. Messrs. Bottle & Olley, architects :—

M. Barnard	£354	0	0
J. W. Bray	275	0	0
J. Leggett	260	0	0
Cork & Beech	259	10	0
B. Springall (accepted)	229	0	0

For the erection of a class-room, &c., to the St. John's Church Schools, Great Yarmouth. Messrs. Bottle & Olley, architects :—

J. Leggett	£145	0	0

For the erection and completion of new hay stores at the Foreign Cattle Market, Deptford, for the Corporation of the City of London. Mr. Horace Jones, architect. Quantities by Messrs. William Reddall & Son :—

	A.	B.	C.
Hubble & Trott	£4,100 0 0	£4,142 0 0	£4,247 0
Hobbs	4,011 0 0	—	—
Staines & Son	3,884 0 0	3,838 0 0	4,004 0
Dickinson	3,748 10 0	3,814 13 0	3,818 0
Gentry	3,650 0 0	3,610 0 0	3,683 0
Howell & Son	3,617 0 0	3,527 0 0	3,733 0
Greenwood	3,568 0 0	3,521 0 0	3,521 0
Dickeson	3,500 0 0	3,440 0 0	3,400 0
Nightingale	3,380 0 0	3,400 0 0	3,415 0
Morter	3,303 0 0	3,183 0 0	3,456 0
Mowlem & Co.	3,299 0 0	3,313 0 0	3,332 0
Richardson	3,104 0 0	2,979 0 0	*2,989 0

* Accepted.

A.—All walls in brickwork.
B.—Internal walls in concrete.
C.—"Imperial stone" paving instead of York stone.

For the alteration and adaptation of the old Monastery Buildings to form new Gut Stores at the Foreign Cattle Market, Deptford, for the Corporation of the City of London. Mr. Horace Jones, architect. Quantities by Messrs. William Reddall & Son :—

	A.	B.
Hubble & Trott	£1,867 0 0	£1,810 0 0
Hobbs	1,847 0 0	—
Howell & Son	1,598 0 0	1,524 0 0
Staines & Son	1,544 0 0	1,526 0 0
Dickeson	1,530 0 0	1,418 0 0
Richardson	1,399 0 0	1,349 0 0
Greenwood	1,353 0 0	1,251 0 0
Nightingale	1,340 0 0	1,285 0 0
Gentry	1,290 0 0	1,235 0 0
Dickinson	1,253 12 11	1,244 7 5
Morter	1,249 0 0	1,231 0 0
Mowlem & Co.	1,246 0 0	*1,209 0 0

* Accepted.

A.—If with York stone paving.
B.—If with "Imperial stone" paving.

Accepted for five cottages at New-road, Holy Well Brook, near Halifax. Mr. T. L. Patchett, architect, Halifax :—

Excavator and Mason's Work.
Thomas Walker, Stainland.
Carpenter and Joiner's Work.
Collins & Hirst, Sowood.
[Total amount, £345.]

For pulling down and rebuilding 56, Cheapside, for Messrs. Wales & McCullock. Mr. B. Tabberer, architect. Quantities by Messrs. Franklin & Andrews :—

Lawrence & Son	£2,167	0	0
F. Mark	2,122	0	0
R. Conder	2,082	0	0
W. Stubbs	2,046	0	0
Downs	2,039	0	0
Patman & Fotheringham	1,983	0	0
Baylis	1,798	2	0

For pulling down and rebuilding 57, Cheapside, for Mr. Thos. Cooksey. Mr. R. Came, architect. Quantities by the architect :—

Lawrence & Son	£1,590	0	0
Downs	1,563	0	0
R. Conder	1,525	0	0
W. Stubbs	1,500	0	0
Patman & Fotheringham	1,485	0	0
F. Mark	1,437	0	0
Baylis	1,204	16	9

For repairs, painting, and additions to offices of St. Matthew, Bethnal-green Board of Guardians. Messrs. T. & W. Stone, architects, 2, Great Winchester-street, E.C. :

Building, Fitting, & Furnishing Co.	£625	0	0 !
Needham & Dilaforce	622	10	0
Cohen	576	0	0
Peers	549	0	0
Thompson & Tweed	543	0	0
Arnold	517	17	0
Sharp	510	0	0
Hawkins	511	0	0
Richards	500	0	0
Oldis Bros.	495	0	0
Wood	471	0	0
Beale	465	0	0
Thompson	461	11	6
Hobbs	453	0	0
Cullis	452	0	0
Chillingworth	397	0	0
Wilson	384	0	0
Deacon	370	0	0
Collins	320	0	0 !

For rebuilding 77, High-street, Ashford, for the Trustee of the late Mr. T. E. Scott. Mr. H. R. King, architect Ashford :—

Giles, Burden, & Giles, Ashford	£665	10	0
J. Wood, Ashford	646	10	0
W. Brooks, Folkestone	640	0	0
J. Hughes, Ashford	635	0	0
W. Baker, Ashford	630	0	0
Denne & Son, Deal	629	0	0
J. Bingham, Headcorn	627	0	0
Howland Bros., Ashford	620	0	0
Tournay & Son	578	18	0

[Architect's estimate, £630.]

For new Mission-house, at Lennox-road, Finsbury Park. Messrs. Searle & Hayes, architects :—

Mattock Bros.	£1,057	0	0
Goodman	946	0	0
Cordell	945	0	0
Wilson & Exton	934	0	0

For the erection of a villa at Lee-on-the-Solent, Fareham, Hants, for Mr. J. C. Robinson. Mr. J. E. Clifton, Swanage, architect :—

Gamblin	£448	16	0
Fullford	390	16	0
Plummer (accepted)	300	0	0

For forming and completing a road at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, surveyor :—

Beaton	£590	0	0
Hayter	240	0	0
Plummer (accepted)	230	0	0
Butt	194	12	6

For the construction of new staircase, &c., to Read's Restaurant, 94 and 95, Cheapside, E.C. Messrs. T. & W. Stone, architects, 2, Great Winchester-street, E.C. :—

Building, Fitting, & Furnishing Co., Limited (accepted)	£240	0	0

For the renovation and reseating of the Birch Meadow Chapel, Broseley. Mr. S. K. Bland, Ipswich, architect :—

R. & J. Millington, Oakengates	£224	0	0
W. & T. Bailey, Ironbridge	213	0	0
C. T. Smith, Broseley (accepted)	211	16	0

For the erection of boiler-room, coal-store, &c., and excavating for basement and subway to the proposed Jones Memorial Block, at the Royal National Hospital for Consumption, Ventnor, I.W. Mr. T. Hellyer, architect, Ryde, Isle of Wight. Quantities supplied by Mr. H. P. Foster, 5, John-street, Adelphi, W.C. :—

Isaac Barton	£1,350	0	0
Ingram & Sons (accepted)	1,295	0	0

For the re-erection of factory premises, 53, Parker's-row, Dockhead, S.E., for Messrs. T. & J. Hosking. Mr. E. Crosse, architect, 32, Bermondsey-square, S.E. :—

C. Clark	£940	0	0
J. Bullers	910	0	0
F. Higgs	799	0	0
A. White & Co. (accepted)	719	0	0

For the erection of "Salvation Army Barracks," Bedminster, near Bristol. Mr. E. J. Sherwood, architect, No. 101, Queen Victoria-street, London. Quantities by architect :—

Francis King, Normanton-road, Bristol	£1,695	0	0
Brock & Bruce, St. Phillip's, Bristol	1,560	0	0
R. J. Crocker, Bedminster, Bristol.	1,557	0	0
H. J. Rossiter, Edgware-road, Bedminster, Bristol	1,495	0	0
H. Rossiter, Allington-road, Bristol	1,440	17	10
Edward King, Stapleton-road, Bristol	1,350	0	0
C. A. Hayes, 7, Redcliff-hill, Bristol	1,300	0	0
F. J. Coxhead, Leytonstone, Essex...	1,285	9	10
J. James, Stapleton-road, Bristol ...	1,199	0	0

For the erection of Mission Chapel, Northfleet, Essex. Mr. Chas. Bell, architect :—

J. Gould	£779	0	0
Mitchell	630	0	0
Wallace	610	0	0
Hopkins	580	0	0
Tuffee (accepted)	510	0	0
Martin	505	0	0
Dering	437	0	0

For the erection of the first part of Kensington Academy for Girls, Addison-road, W. Mr. Hugh McLachlan, architect. Quantities by Messrs. McLachlan & Cuxson :—

Laing & Son	£5,787	0	0 !
E. Stafford	5,769	0	0
Staines & Son	5,555	0	0
Scharien & Williams	5,527	0	0
D. D. & A. Brown	5,463	0	0
E. C. Howell & Son	5,350	0	0
R. & E. Evans	5,280	0	0
Peto Bros.	5,247	0	0
C. Wall	5,220	0	0
A. G. Bolding	5,187	0	0
J. Tyerman	5,136	0	0
J. Allen & Sons	5,030	0	0
Stephens & Bastow	4,999	0	0
Geo. Howard	4,963	0	0
Priestley & Gurney	4,894	0	0
Geo. Stephenson	4,852	0	0
Jas. Williamson	3,268	0	0 !

For painting, &c., at Board Schools, for the School Board for London. Mr. E. R. Robson, architect :—

Scrutton-street (External).			
Cox	£97	15	0
Dearing	94	16	0
Pritchard	91	0	0
McCormick & Sons (accepted)	76	10	0
Scrutton-street (Internal).			
McCormick & Son (accepted)	£169	0	0
York-road, King's-cross.			
Shurmur	£437	0	0
Williams & Son	420	0	0
Grover	404	0	0
Wilmott	397	0	0
McCormick & Son (accepted)	316	0	0
Hammond-square.			
Smith & Son	£484	0	0
Grover	444	0	0
McCormick & Son	438	10	0
G. S. Pritchard	364	0	0
Bowling Green-lane.			
Kirby & Chase	£387	0	0
Catchpole	260	0	0
McCormick & Son	247	10	0
Grover	194	0	0
Blackheath-road.			
Pitchford	£118	0	0
S. J. Jerrard	94	0	0
Holding & Son	85	5	0
G. W. Davis (accepted)	65	17	0
Regent-street, Deptford.			
Pitchford	£122	10	0
Ash	85	10	0
Holding & Son	83	5	0
G. W. Davis	66	12	0
F. Johnson	63	10	0
Creek-road, Deptford.			
Holding & Son	£338	0	0
S. J. Jerrard	250	0	0
F. Johnson	245	0	0
Pitchford	206	12	0
W. Tongue	191	0	0
G. W. Davis (accepted)	184	12	0
Hughes Fields, Deptford.			
Holding & Son	£273	0	0
Johnson	255	0	0
S. J. Jerrard	224	0	0
G. W. Davis	212	16	0
Pitchford	196	0	0
W. Tongue	180	0	0

For painting and general repairs to 1, Soho-square :—

McCormick & Sons (accepted)	£122	10	0

For cemetery chapel and boundary-wall, Bucklebury, Berks. Mr. James H. Money, architect, The Broadway, Newbury :—

	Concrete.	Brick.
E. James	£500 10 0	£592 0 0
W. Goswell	502 0 0	465 10 9
W. Fisher	—	445 0 0
J. C. Cook	395 0 0	428 0 0

For parish-room, mission-room, and verger's house, St. Nicholas, Newbury. Mr. James H. Money, architect :—

W. G. Adey (accepted)	£1,035	0	0

For new shop-front to business premises, Market-place, Newbury, for Messrs. Hawkins. Mr. James H. Money, architect :—

Samuel Elliott	£149	8	0
E. James (accepted)	146	10	0

For building new boys' water-closets and urinals at the British Orphan Asylum, Slough, for the Directors. Messrs. Eddington & Summerbell, architects, Windsor. Quantities supplied :—

Goddard & Son, Eton	£349	0	0
Willis, Eton	318	0	0
Norris, Winkfield	291	0	0
Bowyer, Slough	289	0	0
Deverill, Slough (accepted)	280	0	0

For alterations and additions to Highland Lodge, Foxlane, Upper Norwood, for Mr. Frederic Hetley, M.D. Mr. Frederic W. Ledger, architect :—

R. H. Jenkin	£1,304	10	0
J. Woodward	1,116	0	0
J. & C. Bowyer	1,090	0	0
B. E. Nightingale	1,088	0	0
J. Smith & Sons (accepted)	1,052	0	0

For the erection of a five-quarter brewery at Cardington, Beds., for the Cardington Brewery Company, Limited. Mr. F. T. Mercer, architect, St. Paul's-square, Bedford. Quantities supplied :—

G. Harrison, Bedford (accepted)	£450	0	0

For rebuilding No. 80, Wimpole-street, for Mr. G. Buckston Browne, F.R.C.S. Mr. Chas. H. Worley, architect. Quantities by Mr. R. C. Gleed :—

			Allow for old material.
Lawrance & Sons	£4,950	0	£50 0
Patman & Fotheringham	4,835	0	65 0
Andrew & Nanson	4,695	0	58 0
Downs	4 050	0	75 0
Robinson	3,926	0	153 0

Special Notice.—Lists of tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, Strand, W.C., not later than four p.m. on Thursdays.

TO CORRESPONDENTS.

J. H.—T. H. L.—C. L. T.—E. T. H. (next week).—C. B. A.—U. & Co.—A. L. F.—P. J. D. (next week).—J. C. M. (the principle may be called an old one in England now, and the special method presents no advantage except where flat roofs are the rule).—H. G. & Son.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

PUBLISHER'S NOTICES.

THE INDEX and TITLE-PAGE for Volume XLVI. (January to June, 1884) were given as a Supplement with the Number of July 12.

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Addressed to No. 46, Catherine-street, W.C.

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And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited,
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